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# The Occupation of Driving: A Guide for Occupational Therapists Working with Adolescents Who Have ADHD

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THE OCCUPATION OF DRIVING: A GUIDE FOR OCCUPATIONAL THERAPISTS  
WORKING WITH ADOLESCENTS WHO HAVE ADHD

by

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A Scholarly Project

Submitted to the Occupational Therapy Department

of the

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for the degree of

Master of Occupational Therapy

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## APPROVAL PAGE

This Scholarly Project Paper, submitted by Molly Schmitz, MOT and Morgan Voss, MOT in partial fulfillment of the requirement for the Degree of Master of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

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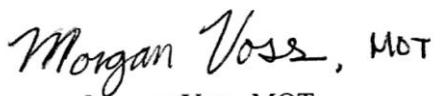
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## ABSTRACT

Driving is a rite of passage for all teens with or without a disability. Individuals with ADHD are at a far greater risk of being in an accident or receiving a traffic violation as compared to their developmental counterparts. In addition, parents and practitioners are often unaware of an individual's readiness to drive skills prior to receiving formal driver's education. Thus, this can be a stressful transition or learning process with individuals with ADHD and their families. For parents, practitioners, and teens, it is important that they understand the resources available to them and the steps to access those resources in order to promote safe participation in the occupation of driving. After an initial literature review and additional research, the authors decided to create a driving resource guide for occupational therapists, families, and teens to assist these individuals in addressing factors that impact occupational engagement in driving. The guide provides them with support, education, and additional resources for program development. The methodology for the development of the resource guide was a review of skills needed for readiness to drive, and provides a review of current driving resources. The resource guide was designed for use by an occupational therapist to bridge the gap in communication between occupational therapy practitioners and individuals with ADHD and their families in relation to readiness to drive. The reproducible handouts from the guide can be given to parents prior to the first occupational therapy visit. The resource guide includes information on communicating with parents and teens, role of OT, value of occupation of driving, screening and assessments, professional development resources, and program development resources.

## **CHAPTER I**

### **INTRODUCTION**

#### **Problem and Significance**

Driving is an occupation that teenagers look forward to gaining the right and privilege to participate in. Driving is a small step for teenagers, with and without disabilities, towards adulthood and independence. Current research by Baker, Unsworth, and Lannin (2015) provides the foundation for pre-driving assessments for individuals with Attention Deficit-Hyperactivity Disorder (ADHD). However, the battery of assessments is still in its infancy. Currently, there are limited resources for occupational therapists who want to be involved in the assessment of and intervention process for teenagers with ADHD who are seeking participation in the occupation of driving. Other research shows that teenagers with ADHD are involved in more accidents than teenagers without a diagnosis of ADHD (Merkel, Nichols, Fellers, Hidalgo, Martinez, Putziger, Burket, & Cox, 2013). Occupational therapists possess the skills to address deficits associated with fitness to drive and safety. The safety of individuals with ADHD who are driving is a concern for occupational therapists, therefore, occupational therapists can play a role in promoting safety

among drivers. However, limited resources prevent occupational therapists from providing skilled services in this area of occupation. Ultimately, the lack of resources would hinder the skilled services provided by occupational therapists, the expansion of practice, the benefits to individuals who would receive such services, and the safety of other drivers.

This scholarly project will investigate the current literature on teenagers with ADHD, driving and the value of occupational therapy. The authors are interested in this population of people with ADHD and how this population relates to the role of occupational therapists. The results presented in this project are a resource guide to assist occupational therapists in promoting the role of occupational therapy to better assess and provide interventions for teenagers with ADHD who are learning to drive. The vision for this resource guide is that it will be utilized by occupational therapists and certified rehabilitation driving specialists when addressing adolescents' safety on the road. These two professions possess the most background and skills for evaluating readiness to drive and safety behaviors associated with driving. Factors that may influence the application and use of this manual consist of federal, state, and local policies on driving rules and regulations, as well as third-party payer and reimbursement policies associated with the changes in health care policy. This resource guide serves both as an advocacy measure for

promoting occupational therapy and its role in ensuring the safety of adolescents with ADHD while driving and also as a resource to advocate for individuals with ADHD in promoting their participation and engagement in driving.

### **Model**

The Model of Human Occupation (MOHO) was chosen when working with individuals with ADHD because it applies to various individuals across the developmental life span and emphasizes the core constructs of environment, volition, habituation, participation, skills, performance capacity, and performance (Turpin & Iwama, 2011). For adolescents, learning to drive is a rite of passage into adulthood and furthering independence. Occupational therapists assist individuals in achieving successful participation in desired occupations. According to research, individuals with ADHD tend to have specific cognitive deficits that create a higher risk for accidents or traffic violations while driving (Vaa, 2014). While using MOHO, occupational therapists can assist in expanding an individual's performance capacity and overall performance to enable his or her participation in driving. Using MOHO provides a guided framework for intervention planning when addressing an individual's motivation to drive and promoting positive and safe driving habits. Thus, utilizing MOHO can define how safety and successful participation in

driving will be examined with individuals with ADHD. The core constructs interact and lead to the individuals developing occupational identity and occupational competence (Turpin & Iwama, 2011). Ultimately, the use of MOHO as a framework will assist establishing guidelines to promote successful and safe participation in driving.

Turpin and Iwama (2011) describe the definition of person to include volition, habituation, and performance capacity. Volition is the pattern of thoughts and feelings about one's self, his or her world, and what he or she does (Turpin & Iwama, 2011). It is important to utilize an encouraging mode to enable individuals to circulate positive thoughts about themselves and their competencies. Volition is made up of personal causation, values, and interests. Using MOHO, the term personal causation, which means how the individual feels about his or her capacity and effectiveness, would apply to the individual's self-efficacy about driving. Values in MOHO's volition are the beliefs and feelings that guide a person in development about what is right or wrong as well as determining what is important to do (Turpin & Iwama, 2011). Driving interventions should be aimed to educate individuals on developing moral codes of right and wrong in relation to driving. The interests of a person are activities or things that a person enjoys (Turpin & Iwama, 2011). Most

teenagers are interested in driving, which adds to the value of being independent and compliant with treatment.

The next concept that defines a person is habituation, which is the readiness to perform consistent patterns of behaviors and thoughts that are influenced by one's habits and roles (Turpin & Iwama, 2011). Habituation has two subcategories of habits and roles. Habits are the patterns of behavior that are consistent and are performed automatically (Turpin & Iwama, 2011). With driving, it will be important for clinicians to utilize practicing positive and safe habits in order to create a pattern of behavior. Turpin & Iwama (2011) highlight the idea that habits allow for a person to have more conscious thought because habits become automatic. Creating automatic, safe driving habits decreases the probability of individuals being involved in accidents or traffic violations. Roles also influence habituation and are defined as a status that have related thoughts, behaviors, and attitudes (Turpin & Iwama, 2011). An adolescent's role should be reviewed with the individual and parent for clarification on expectations. This will come in handy if utilizing behavioral contracts or psychosocial interventions.

The last component of the person is performance capacity. Turpin & Iwama (2011), define performance capacity as the ability to do. Performance capacity is compiled of the subjective experience (feeling and thoughts about

an experience) and the objective experience (muscular, cognitive, neurological abilities) (Turpin & Iwama, 2011). Teenagers with ADHD have the desire (volition) to assume the role of a driver, but the symptoms such as impulsivity and deficits in self-regulation, impact their habits and performance capacity to drive safely.

MOHO emphasizes the importance of the person, but the environment does play a role in occupational performance. Turpin & Iwama (2011) emphasize the idea that environment shapes the way a person does an occupation and the aspects of the person (volition, habituation, and performance capacity). Turpin & Iwama (2011) also highlight the importance of participation in meaningful occupations. Performance in meaningful occupations influences the subjective experience and objective experience of a person (Turpin & Iwama, 2011). The person is impacted by his or her values, interests, performance capacity as well as the environment and participation in occupation. Thus, an adolescent who is learning to drive is influenced by this developmental transition opportunity, creating a meaningful occupation based on a successful transition or, ultimately, obtaining a driver's license. Their successful performance in this meaningful occupation can create a positive subjective experience, while occupational therapists provide intervention to improve the objective experience.

The outcomes in this model are occupational identity and occupational competence. Occupational identity is the feelings that a person has about him or herself in regards to what he or she is doing as well as what he or she wants to do in the future (Turpin Iwama, 2011). Thus, an adolescent's goal for driving is to obtain a valid driver's license, while the parents' goal is for them to be safe on the road. Occupational competence is how well a person maintains engagement and participation in occupations that correlate to his or her occupational identity (Turpin & Iwama, 2011). While participating in driving, competence can be affected by destructive feedback on driving performance, being involved in accidents or receiving traffic violations. Lastly, the role of the occupational therapist is to facilitate occupational performance to its highest potential. In doing so, the occupational therapist strives to ensure successful participation in occupations to promote occupational identity and occupational competence (Turpin & Iwama, 2011). It is the occupational therapist's goal to promote safe and successful driving in order to achieve occupational identity and competence in the individual driver.

### **Glossary of Key Terms**

Attention Deficit Hyperactivity Disorder – one of the most common childhood brain disorders and can continue through adolescence and adulthood.

Symptoms include difficulty staying focused and paying attention, difficulty



controlling behavior, and hyperactivity (overactivity) (American Psychiatric Association, 2013)

Occupational therapy – Occupational therapists help people across the lifespan participate in the things they want and need to do through the therapeutic use of everyday activities (occupations) (AOTA, 2014)

Selective Attention – Maintaining a behavioral or cognitive set in the face of competing or distracting stimuli; It requires activation and inhibition of responses (Toglia, Golisz, & Goverover, 2014)

Divided Attention – The ability to respond simultaneously to multiple tasks or multiple task demands; This is the most difficult level of attention/concentration (Toglia, Golisz, & Goverover, 2014)

Alternating Attention – The mental flexibility that allows an individual to shift their focus of attention and move between tasks having different cognitive requirements; It requires rapid switching from one response set to another (Toglia, Golisz, & Goverover, 2014)

Sustained Attention – The ability to maintain a consistent behavioral response during continuous or repetitive activity (Toglia, Golisz, & Goverover, 2014)

Focused Attention – The ability to respond discretely to specific visual, auditory, or tactile stimuli (Toglia, Golisz, & Goverover, 2014)

Impulsivity – doing things or tending to do things suddenly and without careful thought: acting or tending to act on impulse (Toglia, Golisz, & Goverover, 2014)

Visual inattention – the inability to perceive a stimulus in a visual field when a similar stimulus is presented and perceived simultaneously in the homologous visual field (Toglia, Golisz, & Goverover, 2014)

Psychomotor performance – The coordination of a sensory or ideational (cognitive) process and a motor activity (AOTA, 2014)

Cognition – A term that reflects the mental enterprises related to absorbing information, thinking and goal-directed action (AOTA, 2014)

Executive functioning – initiation, planning, execution, monitoring and self-reflection (AOTA, 2014)

Self-awareness – appreciation of own attributes and initiation of compensatory strategies (Toglia, Golisz, & Goverover, 2014)

Insight/judgment - the capacity to gain an accurate and deep intuitive understanding of a person or thing (AOTA, 2014)

Consciousness – state of awareness and alertness, including the clarity and continuity of wakeful state (AOTA, 2014)

Temperament and personality – self-control, impulse control (AOTA, 2014)

Thought – control and content of thought, awareness of reality vs. delusions, logical and coherent thought (AOTA, 2014)

Higher level cognitive – judgment, concept formation, metacognition, executive functions, cognitive flexibility, insight (AOTA, 2014)

### **Introduction of Chapters**

The following chapters will present *Driving Resource Guide for Occupational Therapists and Individuals with ADHD*. Chapter II is a literature review on ADHD, driving, role of occupational therapy, interventions, and current best practice; the gap in research for the role of occupational therapy affirms the need and reasoning behind the purpose of this study. Chapter III is the methodology and resources used to introduce and develop the product. Chapter IV is the final product, which includes the *Driving Resource Guide for Occupational Therapists and Individuals with ADHD*. Finally, Chapter V consists of a summary of the purpose, key information found throughout this process and recommendations for the dissemination of the scholarly project. Chapter V will also address strengths, limitations of the product, and recommendations for future development and research in this area of practice.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **Introduction**

Attention Deficit- Hyperactivity Disorder (ADHD) is a mental health diagnosis that is estimated to affect approximately 11% of the school-age population (Visser, Danielson, Bitsko, Holbrook, Kogan, Ghandour, Perou, & Blumberg, 2014). Other studies have concluded that the prevalence rate of ADHD is between 4.9% to 13.3% of the children and adolescent populations (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007; Willcutt, 2012). The estimated prevalence varies widely due to the type of reporting (e.g. self-report, parent-report, teacher-report) that is used to calculate the prevalence (Willcutt, 2012).

To meet the diagnosis of Attention-Deficit Hyperactivity Disorder in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), a person needs to have “A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, as characterized by inattention and hyperactivity & impulsivity“ (American Psychiatric Association, 2013). Inattention is characterized by:

often fails to give close attention to details or makes careless mistakes in schoolwork, at work, and during other activities (e.g., overlooks or misses details, work is inaccurate), often has difficulty sustaining attention in tasks or play

activities (e.g., has difficulty remaining focused during lectures, conversations, or lengthy reading), often does not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction), often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., starts tasks but quickly loses focus and is easily sidetracked), often has difficulty organizing tasks and activities (e.g., difficulty managing sequential tasks; difficulty keeping materials and belongings in order; messy, disorganized work; has poor time management; fails to meet deadlines), often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, reviewing lengthy papers), often loses things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones), is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts), is often forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments) (American Psychiatric Association, 2013, p. 23).

Hyperactivity and impulsivity includes squirming or fidgeting, leaving seat in situations where being seated is expected, running about or climbing in inappropriate situations, being unable to participate in occupations quietly, feeling restless, going all the time, talking excessively, blurting out answers, having difficulty with waiting for his or her turn, and interrupting others (American Psychiatric Association, 2013). A person must experience these symptoms in multiple environments (e.g., school, home,

community, etc.) that results in issues with performance in the affected environments (American Psychiatric Association, 2013). Occupational performance, for example driving, can be negatively affected by the symptoms experienced by a person with a diagnosis of ADHD.

Regardless of what subtype of ADHD and what symptoms a person experiences, research is showing that individuals with ADHD experience symptoms that interfere with driving safely (Barkley and Fischer, 2010). For example, in everyday situations, a person with inattention may seem like they are off-task, are lazy or unmotivated, have difficulties with attending to longer tasks, and/or appear being disorganized/ messy. These symptoms have a potential to impair a person's ability to drive safely. A person with hyperactivity and impulsivity may appear to be excessively fidgeting, wanting to move around during inappropriate scenarios, feeling restless, and making hasty decisions. Children with a diagnosis of ADHD tend to struggle with school and social situations because of deficits in executive functioning, attention, risk analysis, and emotional impulsivity (Barkley and Fischer, 2010). Later on in life, adolescents and young adults with ADHD may have difficulties with maintaining a home life, working, social interactions, education, dating/ marriage, finances, driving, and leisure activities due to the lasting symptoms of deficits in executive functioning, risk analysis, and emotional regulation (Barkley and Fischer, 2010).

Another symptom that a person with ADHD experiences is difficulty with executive functioning. Executive functions are cognitive skills, which include working memory, inhibition, reasoning, flexible thinking, problem solving, organization, and planning (Sjowall, Roth, Lindqvist, and Thorell, 2013). Sjowall et al. (2013) found that

children with ADHD perform significantly inferior to their community counterparts in executive functioning skills. Results concluded 35% of the children in this study had significant impairment in their executive functioning (Sjowall et al., 2013). Executive functioning is necessary for everyday living, for school, and for other complex occupations (such as driving).

People with ADHD experience deficits in emotional regulation, which is what Barkley & Fischer (2010) call emotional impulsivity. Emotional impulsivity is the inhibition of emotional responses to events and self-regulation to maintain a more socially appropriate demeanor. Barkley & Fischer (2010) used a battery of tests, which included the Emotional Impulsiveness Scale, to determine the role of emotional impulsivity in the difficulties experienced by a person with the diagnosis of ADHD. The researchers found that emotional impulsivity correlated with self-reports of ADHD and that emotional impulsivity symptoms were experienced more by those with a diagnosis of ADHD than those who did not have a diagnosis. The symptoms identified by the participants include “Quick to Anger,” “Easily Frustrated,” “Over-react emotionally,” “Lose Temper,” and “Easily Annoyed” according to Barkley and Fischer (2010, p. 506). These symptoms were significantly experienced more by those with a diagnosis of ADHD. Emotional impulsivity is another skill necessary for driving, which means that teenagers with ADHD may experience difficulties with driving due to his or her symptoms.

### **Occupation of Driving**

Driving is a privilege that many people enjoy having because of an increase in independence. With the occupation of driving comes the responsibility to follow laws and

regulations, to maintain a functioning car, and most importantly, to drive safely. The ability to drive safely has been questioned by many researchers with a variety of populations (e.g., adolescents, older drivers, etc.). The following are attributes necessary for driving safely: divided attention, alternating attention, emotional regulation, visual tracking and scanning, appropriate force modulation (for gas/ brake pedal), range of motion (to steer), reaction time, problem solving, following directions, appreciation for the law/ rules, understanding of cause & effect, motor planning, coordination, judgment, memory, communication skills, ability to operate a motor vehicle, sequencing and timing, etc. (AOTA, 2010; AOTA, 2013). These are skills assessed during a road test and during an occupational therapy evaluation (AOTA, 2010).

### **Impact of ADHD on Driving**

The literature about how ADHD affects a person's ability to drive safely overall finds that people with ADHD tend to have more accidents, more citations, and more errors in driving (Merkel et al., 2013). The characteristics/ symptoms of ADHD often make daily activities difficult. The following symptoms will interfere with the person's ability to drive safely: inattention, difficulty with impulse control, and difficulties with executive functioning. These symptoms are necessary skills to have in order to drive a car safely. Adolescents with ADHD tend to experience a variety of symptoms that may affect their ability to drive a vehicle in a safe manner.

Previous studies have the consensus that adolescents with ADHD tend to have more risky behaviors and to be involved in more accidents (Chang, Lichtenstein, D'Onofrio, Sjölander, & Larsson, 2014; Merkel et al., 2013; Reimer, Mehler, Ambrosio, & Fried, 2010). Vaa (2014) completed a meta-analysis that included a total of 32 studies,



which were then categorized into 18 studies on driving simulators and 14 studies on medication effects in relation to driving. Vaa (2014) found that drivers with ADHD had more relative risk than those without a diagnosis. Relative risk for drivers with ADHD was rated at 1.36. The number 1.36 of relative risk means that a driver has a 36% increase in risk of being involved in a car accident in comparison to a person without a diagnosis. Drivers with ADHD have more relative risk than drivers with a diagnosis of vision impairments, arthritis, and hearing impairments (Vaa, 2014).

Merkel and colleagues (2013) completed a study where participants with and without ADHD drove with DriveCam technology. The DriveCam is a system that is installed in a person's car. The system includes two video cameras, an accelerometer, and audio recorder. The DriveCam technology was installed in the person's car and it recorded data for three months (Merkel et al., 2013). During the study, the researchers recorded one collision for the non-ADHD group, which was not the driver's fault, while the ADHD group had eight collisions with seven being the driver's fault (Merkel et al., 2013). In their study, Merkel and others (2013) recorded the following information as well: minor events, near misses, crash types, and g-force events. Near misses consisted of taps or hitting of an object where no damage occurred (Merkel et al., 2013). The crash types recorded were categorized as lane departures, intersections, backing up, going straight, or getting hit by someone else. The last piece of information recorded was g-forces, which is defined as erratic driving that is characterized by deceleration or acceleration. The g-forces were measured by the accelerometer. The type of g-forces recorded were forward, lateral, braking abruptly, accelerating abruptly, turning left/ right abruptly, bumps, and other (Merkel et al., 2013). Based on the information gathered,

Merkel and colleagues (2013) concluded that drivers with ADHD have a significantly increased chance to be involved in an accident as well as being at fault for the accident. The researchers also found that drivers with ADHD have more near misses and experienced more abnormal g-forces than drivers without ADHD (Merkel et al., 2013). Merkel et al. (2013) concluded that drivers with ADHD have more impulsivity/hyperactivity, inattention, and distraction, which these symptoms lead to the accidents.

Reimer et al. (2010) add to Merkel and colleagues' findings by stating that drivers with ADHD demonstrate an increase in speeding behaviors when compared to the control group without a diagnosis of ADHD. Reimer et al. (2010) also found that drivers with ADHD tend to focus more on secondary cognitive tasks (e.g. phone calls, answering questions, etc.) over the primary cognitive task of driving. These behaviors are attributed to drivers with ADHD having difficulties with divided attention and alternating attention situations. An example of divided attention is when you are watching the road and listening to music at the same time. An example of alternating attention is switching your focus between listening to directions and completing the direction. Mastering both of these attention types is required for safe driving. These authors found that drivers with ADHD had lower driving performance when given a secondary task and tend to give more attention/ focus to the secondary task, which limits the amount of focus to driving (the primary task) (Reimer et al., 2013).

Chang et al. (2014) also add research to the previous studies with the statement that drivers with ADHD have more serious transport accidents. Chang et al. (2014) define serious transport accidents as accidents that result in hospital trips or death. Over 17,000 individuals with a diagnosis of ADHD were observed for a three-year span via the

Swedish national registry (Chang et al., 2014). Drivers with ADHD have a 45% to 47% increased risk of being involved in a serious transport accident. This risk is decreased when drivers are on medication (Chang et al., 2014).

According to Barkley & Fischer (2010), participants with ADHD and emotional impulsivity did not show any predictors that were significant for crashes, speeding, reckless driving, or driving under the influence, which were noted from the participants' driving records. During self-report of this study, Barkley and Fischer (2010) found that people with ADHD and emotional impulsivity had more license suspensions and total citations received. Overall, Barkley and Fischer concluded that there was no significant difference on driving performance (2010). The study completed by Barkley and Fischer contradicts numerous other studies that show drivers with ADHD have more citations and crashes (Merkel et al., 2013; Reimer et al., 2010; Vaa, 2014).

### **Role of Occupational Therapy**

According to the American Occupational Therapy Association's *Occupational therapy Practice Framework: Domain and Process* (2014), driving is in the domain of occupational therapy, and within the profession's Scope of Practice, as it is considered an Instrumental Activity of Daily Living (IADL). The role of occupational therapist is to promote independence in occupations that a person wants to engage in. An occupational therapist is able to provide support for individuals to safely participate in this occupation. In AOTA's *Driving and Community Mobility Position Paper* (2010), an occupational therapist will address concerns with specific client factors and client skills such as sensory, cognition, motor performance, and contextual or environmental support and barriers to participating in the occupation of driving. In doing so, an occupational

therapist will administer evidence-based driving evaluations to determine the client's baseline skill set, or occupational performance and safety concerns (AOTA, 2010). After determining a client's fitness to drive, client goals, and potential environments, intervention planning and implementation are able to take place as driving rehabilitation.

In addition, Hawley (2015) investigated the knowledge and attitudes of health professionals in giving advice to patients on fitness to drive. This study included multiple disciplines, focusing on primarily the knowledge of occupational therapists and psychologists, through questionnaires and semi-structured interviews (Hawley, 2015). The author found significant results; 98% of occupational therapists felt they should discuss driving as compared to 68% of psychologists (Hawley, 2015). In addition, 95.5% of occupational therapists were aware of fitness to drive guidelines, as compared to 58 % of other therapists. Therefore, occupational therapists demonstrated greater awareness and knowledge of fitness to drive as compared to other health disciplines. Thus, occupational therapists are justified and within their scope of practice, to address fitness to drive.

### **Assessments**

To begin, an occupational therapist must determine the client's performance skills and specific client factors that may impact or have an effect on the individual's ability to drive. Researchers Classen, Monahan, and Wang (2013) examined the clinical and pre-driving performance differences in 22 teens using 180-degree field view simulator, Optec 2500 Visual Analyzer, binocular acuity, Useful Field of View, Useful Field of View Risk index, Beery-Buktenica Developmental Test of Visual-Motor Integration, Comprehensive Trail Making Test, Symbol Digit Modalities Test, Bruininks-Osteretsky

Test of Motor Proficiency - 2 (BOT-2), and Operational Skills Questionnaire. Overall, the authors found that teens with ADHD and Autism Spectrum Disorder (ASD) did poorly on right-eye visual acuity, selective attention, visual-motor integration, cognition, and motor performance. These teenagers also made more errors with visual scanning, speed regulation, lane maintenance, and adjustment to stimuli (Classen et al., 2013). Thus, these findings indicate potential pre-driving deficits associated with individuals who are diagnosed with ADHD. Thus, it is imperative for occupational therapists within an interdisciplinary team to have a defined role to assess pre-driving skills and help to determine fitness to drive to ensure safety on the road for all populations.

To address fitness to drive, researchers Unsworth, Baker, Taitz, Chan, Pallant, Russell, and Odell (2012), developed a standardized off-road assessment battery for occupational therapists called the OT-driver off-road assessment battery (OT-DORA). The battery was initially designed for older adults and those who may be functionally impaired (Unsworth et al., 2012). However, researchers Baker, Unsworth, and Lannin (2015) conducted a systematic review of methods and assessments to assess fitness to drive in individuals with mild Traumatic Brain Injuries (TBI). Baker et al. (2015) concluded subtests from the OT-DORA may prove to be a valid and reliable resource for clinicians when determining fitness to drive. However, no consistent reliability has been found. The tests in the battery include: Snellen Chart, visual confrontation, motor sequences screen, test of proprioception of lower limb, Berg balance scale, motricity index, simulated accelerator-brake test, right heel pivot test, occupational therapy drive home maze test, road law and road craft test, mini mental status examination, and additional tests if clinically indicated (Unsworth et al., 2012). However, is this

assessment battery clinically relevant to individuals with ADHD and would it measure the same validity based on previous research of pre-driving deficits in individuals with ADHD. Additional research has expanded on the contribution of off-road tests to predicting on-road performance. Researchers Kay, Bundy, Clemson, Cheal and Glendenning (2012), found that there currently is no off-road test that is predictive of on-road performance. However, tests such as DriveSafe/DriveAware and SMC Tests had the highest reported sensitivity and specificity (Kay et al., 2012). DriveSafe is an instrument used, in which individuals have to rely on visual memory and awareness in order to report potential hazards in several different slides (Hines & Bundy, 2014). DriveAware is a series of several questions on the individual's perception of his or her driving ability (Hines & Bundy, 2014). Again, both of these assessments were administered with older adult populations and not specifically adolescents diagnosed with ADHD.

### **Current Interventions**

Current interventions that are deemed appropriate for ADHD include pharmacological and behavioral interventions. Sixty-five percent of children who have a current diagnosis of ADHD are taking medication(s) for ADHD while twenty percent of children with a current diagnosis are not receiving behavioral intervention nor taking medication (Visser et al., 2014). Numerous studies have been conducted that focus on driving and safety while receiving pharmacological intervention (Biederman, Fried, Hammerness, Surman, Mehler, Petty, Farone, Miller, Bourgeois, Meller, Godfrey, & Reimer, 2012; Sobanski, Sabljic, Alm, Dittmann, Wehmeier, Skopp, & Strohbeck-Kühner, 2013). Both studies showed improved driving performance and safety when drivers with ADHD were taking a stimulant medication. These current interventions,

especially pharmacological, are often provided by other healthcare professionals, but there is limited knowledge about the role occupational therapist can play in current interventions for individuals with ADHD. In a systematic review by Bruce, Unsworth, and Tay (2014), only two publications were found on the effectiveness of behavioral interventions for driving and individuals with ADHD. However, 11 publications were found on a search for developing behavioral interventions (Bruce et al., 2014).

Even though behavioral interventions are the alternative to pharmacological intervention, only a few studies were found to have sufficient evidence that warrants effective behavioral intervention for this population (Bruce et al., 2014). Poulsen, Horswill, Wetton, Hill, and Lim (2010) found situation awareness in a form of commentary driving and hazard anticipation training (Bruce et al., 2014). Commentary driving is where the individual provides spontaneous and continues commentary, while watching a video from the driver's perspective. The authors provided 'what happens next?' exercises, where videos of actual driving scenarios were viewed and stopped at a predetermined point (Bruce et al., 2014). Hazard response times were measured from the moment when a possible threat first appeared to when individuals responded (Bruce et al., 2014). Poulsen et al. (2010) found results that showed response times exceeded half a standard deviation of the pretest score in both groups: thus, proving clinical importance in the behavioral interventions provided to adolescents with ADHD while driving (Bruce et al., 2014).

In their second search, Bruce, Unsworth, and Tay (2014) found 11 behavioral interventions that address driving with individuals with ADHD. Interventions consisted of commentary driving, driver skills training, computer based training, psychosocial, and

other programs (Bruce et al., 2014). Commentary driving, as addressed previously, was found to be an inexpensive treatment approach. This intervention was provided by driving instructors and requires minimal training. Overall, this intervention has a positive training effect.

The second study by Mckenna, Horswill, and Alexander (2006) had a slightly different approach to commentary driving that provided to have a positive impact on risk-taking behavior (Bruce et al., 2014). A training video of traffic scenarios as well as a recording of police driving instructor commentary were used during this study to see if there was an impact on risk-taking behaviors (Bruce et al., 2014). However, both studies lacked methodological sufficiency and the videos in the second study are not commercially available (Bruce et al., 2014).

Other research addressed driver skills training such as skid training, and error training (Bruce et al., 2014). Despite positive effects, intervention costs of equipment, specifically driving simulators or practice cars, may prove to be costly (Bruce et al., 2014). Another type of driver skills training can be used with one to one driver coaching using 'The System', presented in *Roadcraft: The Police Driver's Handbook* (Bruce et al., 2014). Coyne, Police Foundation, & Mares (2013) found improved situation awareness and overall driving skills in the experimental group (Bruce et al., 2014). Additional computer-based training exists; one example is The Risk Awareness and Perception (RAPT) program (Pollatsek, Narayanaan, Pradhan, & Fischer, 2006; Pradhan, Pollatsek, Knodler, & Fischer, 2009). The purpose of the RAPT program is to train the driver of potential hazards on the roadway, ultimately improving safety (Bruce et al., 2014). Another computer-based training option is DRIVER-ZED (Bruce et al., 2014). Fischer,



Laurie, Glaser, Connerner, Pollatsek, Duffy, and Brock (2002) found the training promoted greater awareness of hidden risks in the experimental group.

A behavioral program that has been researched and shows promise to help reduce speeding behaviors of adults with ADHD is one developed by Markham, Porter and Ball (2013). This program has the features of GPS tracking to determine speeding habits of adults with ADHD and incentives and tracking to decrease the speeding behaviors (Markham et al., 2013). The program includes disincentives and incentives based on the participants' driving speed; for example, if the participant drove the speed limit, he or she would receive an incentive (gaining money) but if he or she drove over the speed limit, a disincentive of losing money was given. There was also the behavioral approach of having the GPS to track speeds within the car. The authors found that overall speeding behaviors were reduced, but they are unsure of which behavioral approach had the most effect on this behavior since there is no way to dissect the impact of each approach from the others (Markham et al., 2013).

Other interventions address psychosocial programs, such as Reduce Risk Increase Student Knowledge in the form a driver safety program. Senserrick, Ivers, Boufous, Chen, Norton, Stevenson, Van Beurden, & Zask (2009) found a 44% reduction in risk for individual who participated in the program (Bruce et al., 2014). Another program is Supporting a Teen's Effective Entry to the Roadway (STEER) Program. The program involves parent training, communication training for families, and supervised practice with the use of a simulator (Bruce et al., 2014). Lastly, *Drive 4 Life* is a documentary of real people affected by road trauma used to view, reflect and modify existing behavior (Bruce et al., 2014). Thus, several behavioral interventions exist, but further research on

these interventions is warranted to determine the effectiveness of outcomes. Other programs exist as well, however, they do not have peer reviewed research published. An example is *Drive Smart*, which addresses driver-related cognitive perception (Bruce et al., 2014). Regan, Triggs, & Godley (2000) conducted software research, which suggested training tools are effective for attention control and risk perception skills (Bruce et al., 2014). In summary, limited research supports driving interventions provided by occupational therapists for this specific population despite interventions provided by other healthcare professionals being available in the present day.

### **Conclusion**

In summary, individuals with ADHD present with a significant increased risk to injury and being involved in accidents when driving due to increased deficits in attention, risk taking, impulse control, and distraction (Merkel et al., 2013). There is also evidence of lack of consistencies with assessments of individuals with ADHD. Current research has significant gaps in the efficacy and efficiency of current assessments in their infancy. However, literature has also revealed occupational therapy is within their scope of practice when addressing the need to drive, or community mobility. In addition, clinicians are also lacking adequate evidence-based interventions to address successful and safe participation in driving due to overall lack of research. Thus, there is a definite need to advocate for this population, provide education, and conduct research. Further research is needed to develop beneficial resources that will better equip and prepare occupational therapists to assess and treat individuals with ADHD who want to drive. The guide created in this scholarly project, which is titled *Driving Resource Guide for Occupational Therapists and Individuals with ADHD*, may not only increase awareness

about assessments and interventions available for occupational therapists to use but also propel research to create a more evidence-based practice. The purpose of this project is to facilitate communication between occupational therapists, teenagers, and their families. The resource manual also serves the purpose of providing information about working with teenagers with ADHD who want to drive safely. This resource guide includes information on assessments available to occupational therapists, on researched interventions, on how to advocate for the adolescent, and on different referrals a teen may need. This manual will aim to serve as support for occupational therapists as they prepare individuals with ADHD to drive more effectively for the challenging scenarios associated with driving. Thus, the manual will promote the safety and independence of individuals with ADHD when participating in driving.

### **CHAPTER III**

#### **METHODOLOGY**

During the development of the *Driving Resource Guide for Occupational Therapists and Individuals with ADHD*, the authors were aware of the challenges and safety concerns associated with families and their adolescents with ADHD. The challenges and safety concerns faced by teenagers with ADHD, their families, and an occupational therapist sparked a calling to fill this need. Sources have indicated the need for resource tools for practitioners to support safe participation in driving for individuals with ADHD. The purpose of this resource guide is to assist practitioners working with the population of individuals with ADHD who are beginning to drive. A literature review was conducted in order to assess the areas of need with this particular population and determine the gaps within the literature.

In the US, fitness to drive testing is not a mandatory requirement to obtain a driver's license. However, research shows the significant increase in traffic violations and motor vehicle crashes with individuals with ADHD (Merkel et al., 2013; Vaa, 2014). Merkel et al. (2013) found that drivers with ADHD had a greater significant chance of being involved in an accident as well as a greater significance for being at fault for the accident. Therefore, there is a significant need to address safety concerns with this population. It was also identified that there is limited empirical evidence on the

psychometric properties of assessments determining fitness to drive (Baker et al., 2015). Furthermore, there is limited evidence to support fitness to drive assessments and interventions that are specific to the population of individuals with ADHD (Bruce et al., 2014). Thus, there are limited resources available for professionals expected to address this concern, resulting in a lack of confidence and inadequate attention given to the needs of this population. Based on the problems identified, an extensive literature was completed. Literature articles were obtained through a search of PubMed, AOTA, PsychINFO, and Google Scholar. Search terms used included “attention deficit disorder with hyperactivity”, “automobile driving”, “cognition”, “driving”, “teen driving”, “OT-DORA”, and “occupational therapy AND teen driving”. Each article obtained was read, assessed, and critically appraised for the level of evidence and relevancy for creating the literature review and composing the driving resource guide. Coinciding articles were then assembled together to prepare the best outcome for the product. The resource guide developed is broken into the following categories: communicating with teens and parents, value of driving, the role of an OT, screenings & assessments, interventions, interdisciplinary interventions, case study, *Fitness to Drive Decisions for Acute Care and ADHD* article (Baker, Bruce, & Unsworth, 2015) and additional resources. Other supplemental documents containing beneficial information on driving and individuals with ADHD were reviewed to solidify the need for this scholarly project and were added as additional resources.

A variety of occupational therapy theories and models were discussed for their potential use in the development of this scholarly project. The model chosen that best fits this research was the Model of Human Occupation (MOHO). The main assumption of

this model is that people are engaging in occupations within a context, which results in occupational identity and occupational competence (Turpin & Iwama, 2011).

Occupational performance, the environment and all aspects of the person influence each other. Occupational therapists specialize in task analysis and are able to provide support when engaging in occupations in the natural context. In doing so, the occupational therapist strives to ensure successful participation in occupations, which the person identifies as meaningful.

Once the information was collected and organized, areas and patterns of deficits for children with ADHD became evident. Overall, there is a distinct lack of information on the specificity and sensitivity to this population and driving outcomes. There is a general lack of education and understanding of factors associated with learning to drive and the impact it has on individuals with ADHD. From the results of the literature review and identifying the need in practice, the authors decided to create a driving resource guide. Occupational therapy assessments and intervention strategies were identified using the aforementioned various search engines and availability of resources from the University of North Dakota Occupational Therapy Department. A review of literature on assessments currently being used in driving was completed to find assessments and interventions that have been researched for teenagers with ADHD who want to drive. MOHO was used as a guide during the development of this resource guide based on the core concepts associated with the model, especially volition. For example, adolescents want (volition) to gain a successful occupational identity of being a driver and drivers with ADHD need additional supports to gain occupational competence with driving due to pre-existing visual perceptual, cognitive, and motor coordination deficits. The need

that supports this resource guide submission is that there is no defined role of occupational therapists in the driving assessment of teenagers with a diagnosis of ADHD, in addition to a lack of resources to guide intervention planning for practitioners. This *Driving Resource Guide for Occupational Therapists and Individuals with ADHD* was created in order to improve future occupational therapists knowledge about individuals with ADHD and the impacts on teen driving. In addition, this resource manual will expand the scope of practice of OT by providing resources for program development and creating critical pathways for referral sources. By expanding referral sources and program development, the practice of OT is expanded as a result of providing services to more individuals and more populations.

## **CHAPTER IV**

### **PRODUCT**

The purpose of this scholarly project was to design a resource manual for occupational therapists to use when working with clients who have ADHD and who want to drive. This resource manual can help an occupational therapist bridge the communication with parents, families, and the client about concepts of driving and the impact on individuals with ADHD. Occupational therapists are invested in this area because there is research that shows teenagers with ADHD have increased risk for being involved in an accident (Chang et al, 2014; Merkel et al, 2013; Reimer et al, 2010; Vaa, 2014).

*Driving Resource Guide for Occupational Therapists and Individuals with ADHD* was designed with information pertaining to occupational therapists working with teenagers who have ADHD and want to drive. The guide is organized into nine sections; the sections are introduction, role of OT, driving specialists, assessments, practice training programs, other professionals, additional resources, case study, and references. This resource manual will be used by occupational therapists who work with teenagers who have ADHD and are interested in driving. The resource manual also provides information about assessments, interventions, and other disciplines that a person with ADHD may be referred to. The authors of this resource manual have received copyright



permission from the following companies: AAA Foundation and the American Occupational Therapy Association to put informational materials in the additional resources of this resource manual.

The resource guide design was guided by MOHO. When using MOHO, the main constructs were implemented into designing and determining the need of the population. For example, driving is a rite of passage for all teens and creates a sense of independence/transition into adulthood. When using the concepts of MOHO, researchers compared the concepts of volition, habituation, performance capacity and dimensions of doing in relation to fitness to drive and a teen's motivation to drive, and ultimately, motivation for independence. These concepts are incorporated into the resource guide; for example, the aspect of motivation is addressed in the section of "Value of Driving." The main constructs important in MOHO are volition, habituation, performance capacity, environment, and dimensions of doing. These constructs are relevant to this population of individuals with ADHD due to the interconnectedness of each component impacting an individual's capacity to drive. The constructs of MOHO relate to the occupation of driving. Volition is required for driving because the teenager has to want to drive and want to drive safely. Habituation is the next construct; studies show that teenagers with ADHD have poor habits of acting upon impulses, which leads to accidents (Vaa, 2014). Performance capacity means that teenagers with ADHD have the ability to drive, which may lead to increased independence. The interconnectedness is the result of pre-existing performance capacities and volition, and readiness to drive. For example, an individual has to be self-motivated to learn to drive, in addition to having the foundational skills to drive. An occupational therapist can create a stronger interconnection through

interventions that address an individual's initial performance capacity and volition. The product is presented in completion in the section following.

# Driving Resource Guide for Occupational Therapists and Individuals with ADHD

Molly Schmitz, MOTS

Morgan Voss, MOTS

Suzanna Morrison, MSOT, OTR/L

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# Introduction

## Welcome

Due to the passion for OT and expanding our scope of practice, a resource guide was created to aide future practitioners working with individuals with ADHD and their participation in driving. Both creators share the passion to promote and expand role emerging fields, especially teens with ADHD driving, and its relation to the profession of Occupational Therapy.

## Purpose

The purpose of this guide is to serve as a resource guide for occupational therapists (OT) practitioners, whether generalists or specialists, working with individuals with ADHD, who are participating in the occupation of driving. Research has shown the impact on safety concerns for individuals with ADHD and driving (Merkel, Nichols, Fellers, Hidalgo, Martinez, Putziger, Bruket, & Cox, 2013; Vaa, 2014). Minimal resources are available on for individuals, with ADHD, who are transitioning into the occupation of driving. Following an extensive literature review, this guide has been compiled to include information on communicating with parents and teens, role of an OT and addressing readiness, assessments, and intervention strategies for OTs to utilize when working with individuals with ADHD, who wish to participate in driving safely.

## Model

Using the overarching Model of Human Occupation (MOHO), OTs consider the individual's volition, habituation, environment, and participation in an occupation (Turpin & Iwama, 2011). OTs can assist in expanding an individual's performance capacity and overall performance to enable their participation in driving. Using MOHO provides a guided framework for assessment and intervention planning when addressing an individual's motivation to drive and promoting positive and safe driving habits. This will ensure the safety and successful participation in driving of individuals with ADHD. The core constructs interact and lead to the individual developing occupational identity, occupational competence, and occupational adaptation (Turpin & Iwama, 2011).



## Communicating with Parents and Teens

## Communicating with Parents and Teens

The intent of these pages is for occupational therapists to reproduce and distribute to teenagers and their families as resource on driving. These pages also serve as a reminder for occupational therapists to open communication lines between themselves, parents, and teenagers about the occupation of driving.

As a parent with a child, life can be hectic. Life may seem more hectic if you have a child with a disability, such as ADHD. Day to day practices should focus on providing structure and organization, managing environmental factors and creating positive and negative reinforcement incentives for individuals to become successful. Figure out when your child is most vulnerable, this could be in the morning or afternoons. Doing so will enable individuals to create a schedule of when driving or homework is best to take place. There are several ways to improve your child's performance. Be sure to understand your family values, priorities and expectations of your child, so that the therapist can fully help you achieve you and your child's goals of safe driving. One way is to focus on completing more than one task at a time, another is completing only one task at a time, and lastly one could complete an activity with another person (Strzelecki, 2011).

### **Start Early**

When it comes to driving, have the conversation about driving and driving safety early on. This communication will be key to building rapport with individuals and their families. Driving is a significant mode of independence and image of adulthood. As an OT, it is our goal to promote independence in everyday activities. This entails an individual's ability to get him or herself to and from school or a job (Strzelecki, 2011).

### **Skill Sets are Similar**

A key point is that occupational therapy practitioners can evaluate when considering whether a young adult with disabilities would be eligible for driving instruction, many of which are also components that school-based occupational therapy practitioners can work on with students before they reach the driving age. Skills needed for driving consist of reaction times, visual skills, and cognitive skills (Strzelecki, 2011).

## **Orientation**

How well oriented is the individual? Before addressing specific driving skills, is the student able to make his or her way from the front of the school building to the back of the building? Being able to navigate is listed in the occupation of community mobility. If the multidisciplinary team feels an individual is an appropriate candidate for driving, then some activities can be worked into his or her occupational therapy program or

## **Social Inclusion**

Adolescents want to fit in with their peers and ultimately want to be on track to develop that driving independence. Independence in driving will allow your teenager to provide transportation to and from other occupations such as social outings, education, etc. (Strzelecki, 2011).

## **A Novice Driver is still a Novice Driver**

All 16 year olds, whether with a disability or not, are still inexperienced drivers. Thus, teens with disabilities are at an even greater challenge because they must develop foundational skills required for driving before they get into a car (Strzelecki, 2011).

## **Independence and Emotion Regulation**

Individuals still need to have that desire to be independent in every area of their lives before they think about driving. There are many levels of independence, both physically and emotionally, that they need to get to before any teen can be an independent driver. Individuals need to demonstrate confidence as it drives their emotions in motivation to drive. In addition, it is essential that individuals to have the emotional maturity to receive feedback, and for instructors to explain why a student can't currently do something, and how the individual is able to correct it. This enables an individual to take responsibility for recognizing deficits, mitigates fear and lack of experience, and increases the development of skills they need to do things that are important to them (Strzelecki, 2011).

## **Parents**

Parents gain freedom from being the chauffeur of getting their children where they need to go. Do not isolate your child. Allow them to sit in the front seat so they have experience with the view from the front of the vehicle. Here you can practice calling out speed signs, attending to pedestrian signs, or practicing light changes. Practicing these skills can help teens become more comfortable. Here they are also better able to observe the driver and they can see how and when to incorporate a turn signal. This also provides an opportunity to provide a running commentary, verbalizing what you are seeing and reacting to (Strzelecki, 2011).

## Value of the Occupation of Driving

## **Value of the Occupation of Driving**

Driving is a privilege that many people enjoy having because of an increase in independence. With the occupation of driving comes the responsibility to follow laws and regulations, to maintain a functioning car, and most importantly, to drive safely. Driving safety has been questioned by many researchers with a variety of populations (e.g., adolescents, older drivers, etc.). These are some necessary skills for driving safely: divided attention, alternating attention, emotional regulation, visual tracking and scanning, appropriate force modulation (for gas/ brake pedal), range of motion (to steer), reaction time, problem solving, following directions, appreciation for the law/ rules, understanding of cause & effect, motor planning, coordination, judgment, memory, communication skills, ability to operate a motor vehicle, sequencing and timing, and etc. (AOTA, 2010; AOTA, 2013). These are some of the skills assessed during a road test and during an occupational therapy evaluation (AOTA, 2010).

## Role of OT

## Addressing Driving Readiness

These pages also serve as a reminder for occupational therapists to continue their education, which could include topics on driving, and to know their role within the occupation of driving.

According to the American Occupational Therapy Association's *Occupational therapy Practice Framework: Domain and Process* (2014), driving is considered to be in the domain of occupational therapy and in the profession's Scope of Practice. Driving is considered an Instrumental Activity of Daily Living (IADL). Occupational therapy practitioners are experts in addressing the essential everyday activities of daily living. In AOTA's *Driving and Community Mobility Position Paper* (2010), an occupational therapist will address concerns with specific client factors and client skills such as sensory, cognition, motor performance, and contextual or environmental support and barriers to participating in the occupation of driving. In doing so, an occupational therapist will administer evidence-based driving evaluations to determine the client's baseline skill set, or occupational performance and safety concerns (AOTA, 2010). After determining a client's fitness to drive, client goals, and potential environments, intervention planning and implementation are able to take place as driving rehabilitation.

In addition, Hawley (2015) investigated the knowledge and attitudes of health professionals in giving advice to patients on fitness to drive. This study included multiple disciplines, focusing on primarily the knowledge of occupational therapists and psychologists, through questionnaires and semi-structured interviews (Hawley, 2015). The author found significant results, 98% of occupational therapists felt they should discuss driving as compared to 68% of psychologists (Hawley, 2015). In addition, 95.5% of occupational therapists were aware of fitness to drive guidelines, as compared to 58 % of other therapists (Hawley, 2015). Therefore, occupational therapists demonstrated greater awareness and knowledge of fitness to drive as compared to other health disciplines. Thus, occupational therapists are justified and within their scope of practice, to address fitness to drive.

For teens, transportation affects access to employment, housing, social, educational, and recreational opportunities. Occupational therapy can contribute to an

adolescent's potential to drive by addressing pre-driving skills that promote independence, such as coordination and quick use of the extremities, crossing streets, managing social interactions, managing time, managing money, handling an emergency, and self-care when alone. Managing impulse control, reducing stress, and regulating sensory input are essential for all adolescents, regardless of disability. Additional community mobility skills addressed by occupational therapy with this population include reading maps or using a GPS, obtaining a first driver's license, and using public transportation.

Occupational therapists are experts in addressing the everyday activities of living. The following services can also be implemented by occupational therapists, in regards to the occupation of driving:

- A) Identify the transition coordinator in their school district, if applicable, and become familiar with transition programs and services that pertain to youth transportation.
- B) Identify driver rehabilitation specialists in the area. A list of certified professionals is provided on the Association for Driver Rehabilitation Specialists (ADED) website
- C) Talk with teens and their parents about the occupation of driving. Ask them whether they plan to drive or take public transportation to access the community. Start the conversation about their readiness and appropriateness to drive vehicles
- D) Refer to driver rehabilitation specialists as needed for specialized driver evaluation and intervention
- E) Teach community mobility, personal safety, and use of public transportation (i.e. planning trips, calculating fares, reading maps).



## **Occupational Therapy Process for Driving and Community Mobility for Teens with ADHD**

The occupational therapy process consists of evaluation, intervention planning, intervention implementation and discharge planning. The following schematic demonstrates the occupational therapy process in relation to driving evaluation and intervention, which was produced by the American Occupational Therapy Association and the National Highway Traffic Safety Administration.

# Occupational Therapy Process for Driving and Community Mobility for Teens with ADHD

## Occupation Profile Domain: Area of Occupation Instrumental Activity of Daily Living: Community Mobility

- Where does the client need to go?
- How can they get there?
  - Walk
  - Drive
  - Family and friends
  - Public transit
  - Paid transit
  - Other

 Light – Generalist

 Medium – Client Choice

 Dark – Driver Specialist

\*Choice – Option to get driving evaluation with informed risk of deficits and concerns

↓

**Driving is identified as a valued occupation.**

↓

**Observe performance of complex IADL**  
(Evaluation of vision, cognition, motor, perception)

↓

**Strengths, weaknesses, resources**

↓

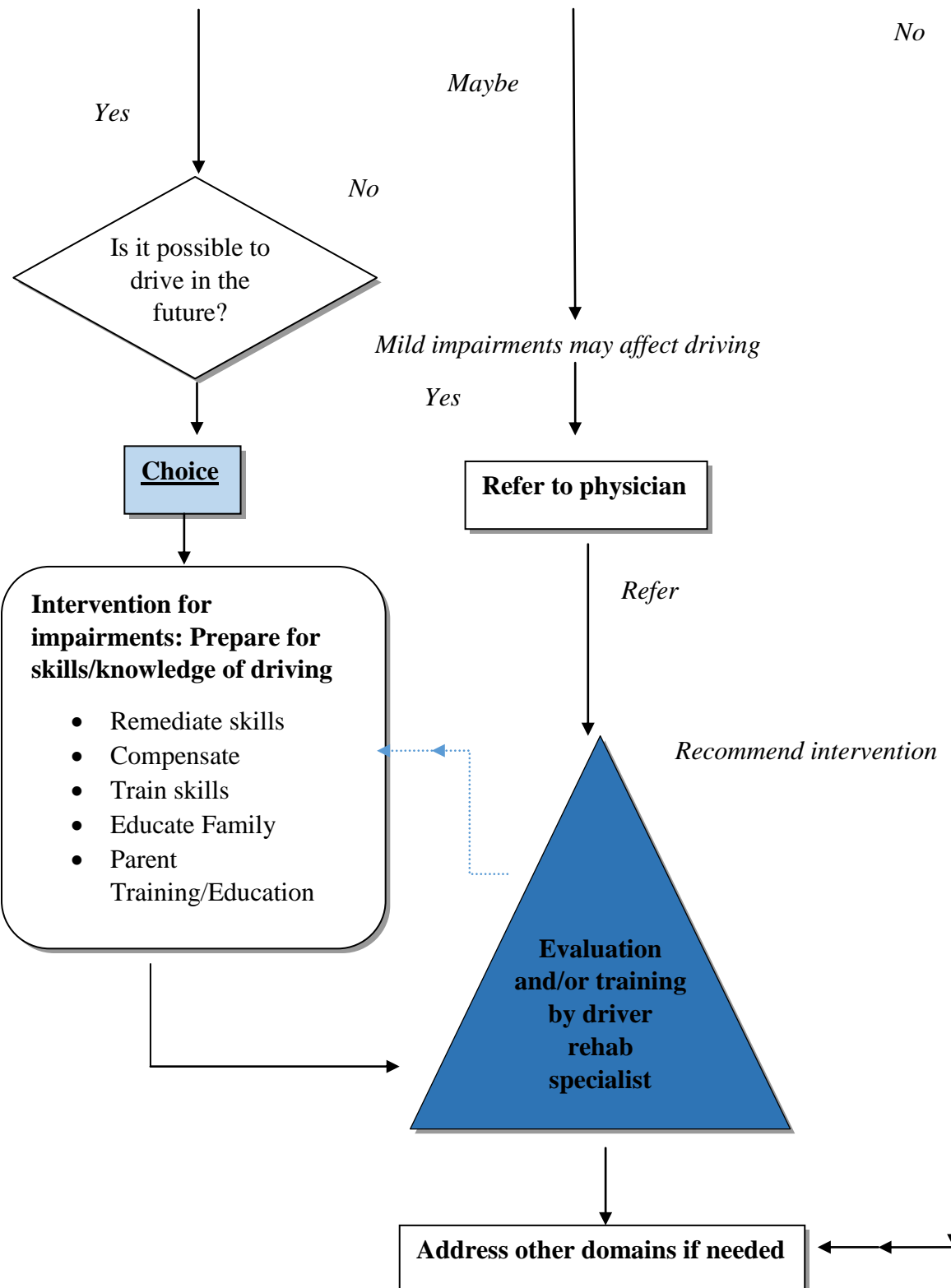
Goals and plans for:

- Driving
- Walk

↓

Are these impairments that trigger problems with driving?

↓



This is a product of a cooperative agreement between the American Occupational Therapy Association and the National Highway Traffic Safety Administration.

## Where to Start?

To get started in the field of driver evaluation and intervention, occupational therapists can apply much of what they currently do and already know. OTs are trained in task analysis and in identifying the appropriate match of activity demands and skills to achieve optimal outcomes. Thus, OTs are experts in addressing the essential and everyday activities of daily living. You build on this foundation when receiving specialized training in driver rehabilitation. By choosing to specialize in driver rehabilitation, you are helping individuals remain mobile and independent. You are helping ensure their meaningful participation in the community your specialized training can help optimize a teen driver's ability to drive safely and be active in their community. This transition provides one of many stepping-stones into adulthood and additional areas of occupation.

Each section in this guide provides detailed tips, lessons, additional resources, continuing education, and current evidenced-based literature for interventions and evaluations. Tools are presented in a range of formats to be used with or without modifications to better fit the needs of the individual setting or geographical region.

## Continuing Education Opportunities

Many opportunities exist for occupational therapists to play an active, professional role in serving teens and others in need of driving evaluation and intervention and community mobility services. There is an increasing prevalence of ADHD due to changes in diagnostic criteria and increased awareness in our population (Merkel, Nichols, Fellers, Hidalgo, Martinez, Putziger, Bruket, & Cox, 2013; Vaa, 2014). Driving will play an increasingly important role in enabling teens with ADHD to stay safe in their communities. AOTA offers educational opportunities for occupational therapy practitioners to expand their skills in this exciting practice area and to build on existing skills in adolescent safety and community mobility. These resources include information on driving rehabilitation specialty certifications for occupational therapy practitioners, and direct access to continuing education courses such as seminars or online courses.

For those occupational therapists who want to become more proficient in driving rehabilitation or task analysis. The following continuing education courses and programs have been recommended by AOTA in regards to teen driving and intervention planning.

### Driving Assessment & Training Techniques

**Course Description:** Students with Asperger syndrome, nonverbal learning disabilities, autism, traumatic brain injury, and attention deficit disorders, as well as those with lower IQ scores, present a challenge to occupational therapists practicing in the area of driver rehabilitation. This highly visual and creative course addresses skills deficits related to those diagnoses. Using methods and tools that address the skills needed for driving, including video review, participants will be able to assess and make decisions about a student's readiness to drive and put the techniques learned directly into their practice. Participants will gain intervention techniques to help their clients develop the social and executive function skills necessary for specific driving tasks.

**CEUs:** Earn 1 AOTA CEU or 12.5 NBCOT PDUs

**Website:** [http://myaota.aota.org/shop\\_aota/prodview.aspx?TYPE=D&PID=866&SKU=4837](http://myaota.aota.org/shop_aota/prodview.aspx?TYPE=D&PID=866&SKU=4837)

**Creating Successful Transitions to Community Mobility Independence for Adolescents:  
Addressing the Needs of Students with Cognitive, Social and Behavioral Limitations (Online)**

**Course Description:** Addresses the critical issue of community mobility skill development for youth with diagnoses that challenge cognitive and social skills, such as autism spectrum and attention deficit disorder. Community mobility is vast in that it includes mass transportation, pedestrian travel, and driving, and is essential for engaging in vocational, social, and educational opportunities. The course is appropriate for occupational therapy practitioners practicing in educational settings and in driver rehabilitation. The practitioner in the educational setting will learn how to address community mobility in context of the individual education plan. The occupational therapy practitioner practicing in driver rehabilitation will gain understanding into the impact of these diagnoses on community mobility skills and be better able to identify when a student is ready for driving.

**CEUs:** Earn .7 AOTA CEUs or 8.75 NBCOT PDUs

**Website:**

[http://myaota.aota.org/shop\\_aota/prodview.aspx?TYPE=D&PID=159088800&SKU=OL48](http://myaota.aota.org/shop_aota/prodview.aspx?TYPE=D&PID=159088800&SKU=OL48)

**Driving and Community Mobility**

**Course Description:** The range of issues for driving and community mobility is vast and can extend across the lifespan. Occupational therapy professionals who are generalists or specialists have the knowledge and skills to address the important IADL of community mobility, including driving. Therapists, through evaluation, intervention, and consultation, can address not only driving and community mobility skills but also the underlying skills (visual, motor, or cognitive) and environmental and other contextual factors that enable and empower a person to participate in the community. This text, which is also available as a Self-Paced Clinical Course, provides strategies to address community and driving across occupational therapy practice areas and settings, including administration and management, schools, acute care hospitals, rehabilitation centers and skilled nursing facilities, and outpatient clinics, and with clients with various disabilities or difficulties, including developmental, physical, sensory processing, vision, and mental health.

**CEUs:** Earn 2 AOTA CEUs or 25 NBCOT PDUs

**Website:** [http://myaota.aota.org/shop\\_aota/prodview.aspx?TYPE=T&TID=DCM&CPK=2](http://myaota.aota.org/shop_aota/prodview.aspx?TYPE=T&TID=DCM&CPK=2)

### **Transitions to Community Mobility**

**Course Description:** Addresses the critical issue of community mobility skill development for youth with diagnoses that challenge cognitive and social skills, such as autism spectrum and attention deficit disorder. Community mobility is vast in that it includes mass transportation, pedestrian travel, and driving, and is essential for engaging in vocational, social, and educational opportunities. The course is appropriate for occupational therapy practitioners practicing in educational settings and in driver rehabilitation. The practitioner in the educational setting will learn how to address community mobility in context of the individual education plan. The occupational therapy practitioner practicing in driver rehabilitation will gain understanding into the impact of these diagnoses on community mobility skills and be better able to identify when a student is ready for driving.

**CEUs:** Earn .7 AOTA CEUs or 8.75 NBCOT PDUs

**Website:** [http://myaota.aota.org/shop\\_aota/prodview.aspx?TYPE=D&PID=825&SKU=4833](http://myaota.aota.org/shop_aota/prodview.aspx?TYPE=D&PID=825&SKU=4833)

### **Driving Assessment and Training Techniques**

**Course Description:** Students with Asperger syndrome, nonverbal learning disabilities, autism, traumatic brain injury, and attention deficit disorders, as well as those with lower IQ scores, present a challenge to occupational therapists practicing in the area of driver rehabilitation. This highly visual and creative course addresses skills deficits related to those diagnoses. Using methods and tools that address the skills needed for driving, including video review, participants will be able to assess and make decisions about a student's readiness to drive and put the techniques learned directly into their practice. Participants will gain intervention techniques to help their clients develop the social and executive function skills necessary for specific driving tasks.

**CEUs:** Earn 1 AOTA CEU or 12.5 NBCOT PDUs

**Website:**

[http://myaota.aota.org/shop\\_aota/prodview.aspx?TYPE=D&PID=1590890119&SKU=OL4837](http://myaota.aota.org/shop_aota/prodview.aspx?TYPE=D&PID=1590890119&SKU=OL4837)

### **Occupational Therapy Driver Off-Road Assessment (OT-DORA)**

**Course Description:** As the population ages and more people with disabilities seek to drive, occupational therapists will increasingly need to address this instrumental activity of daily living with their clients. The OT-DORA Battery is a unique, user-friendly, and convenient collection of assessments that allows efficient evaluation of an individual's cognitive, perceptual, behavioral, physical, and sensory skills and abilities that are related to driving, prior to an on-road assessment. The OT-DORA also offers the ability to screen clients who are unsafe to take an on-road assessment.

Done easily in a clinical setting, without driving simulators or taking the client on-road, the OT-DORA Battery allows practitioners to, with minimal risk and expense, find clients' strengths and weaknesses and pinpoint areas on which to focus during rehabilitation. The manual describes how the OT-DORA was developed, summarizes research to support its use, and details instructions on how to administer the Battery with clients. A flash drive contains downloadable and writable versions of the administration and client response booklets for use in the United States, Canada, the United Kingdom, and Australia.

Sections of the assessment include the initial interview, medical history, medication screen, sensory assessments (communication and hearing, vision, and proprioception), physical assessments (motor skills, balance, and endurance), cognitive assessments, summary of issues and further assessments.

The OT-DORA Battery can be administered by generalist and specialist occupational therapists as well as by other health professionals with specialized training, experience, and certification in driver assessment, as well as by driver rehabilitation professionals with specialized training in determining how health-related changes can affect performance skills and elicit patterns that may compromise driving ability

**Website:** [http://myaota.aota.org/shop\\_aota/prodview.aspx?TYPE=D&PID=87188032&SKU=1261](http://myaota.aota.org/shop_aota/prodview.aspx?TYPE=D&PID=87188032&SKU=1261)



## **Specialty Certification in Driving and Community Mobility**

In addition to Continuing Education, an OT can go on to a more specialized practice. Specialty practice in driving and community mobility is a very dynamic and diverse field. It encompasses the full spectrum of mobility within the community, including pedestrian and bicycle travel; driving and riding in private automobiles; and transportation via transit, such as school buses, trains, para-transit, and bus systems. Occupational therapy service delivery may involve:

- Determining fitness to drive
- Training in the use of several modes of community mobility
- Driving rehabilitation
- Facilitation of traffic safety programs
- Consultation or advocacy with transit companies, municipalities, or policy making entities in support of community mobility

An overview of Specialty Certification in Driving and Community Mobility can be found on the AOTA website.

### **Applications for specialty certification**

A completed application will consist of two parts: the PDF application and the portfolio evidence forms. Examples are also provided to applicants to better understand how to complete the various portfolio evidence forms on the AOTA website. Follow the instructions in the application itself for submitting your completed application.

See more at <http://www.aota.org/Education-Careers/Advance-Career/Board-Specialty-Certifications/Driving-Community-Mobilit.aspx#sthash.Qg3mZ8M8.dpuf>

## Screening & Assessments

## ADHD Assessments

### ADHD Symptom Checklist-IV (ADHD-SC4)

This assessment is used to screen for attention deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder and to monitor the child's response to treatment. It can be used with individuals ages 3 to 18. The assessment takes approximately 5 minutes to complete. Items needed are the ADHD manual, ADHD-IV checklists, and Symptom Severity Profile score sheets. The assessment can be administered by occupational therapist and is distributed to parents and teachers as well. The assessment kit costs \$63.00. Additional information for this assessment can be found at [www.checkmateplus.com](http://www.checkmateplus.com)

## Executive Functioning Assessments

### Behaviors Rating Inventory of Executive Function – Adult Version (BRIEF<sup>tm</sup> – A)

This assessment is used to assess executive functioning and self-regulation. The assessment can be administered to individuals ages 18-90, including those with a wide variety of physical and psychiatric disabilities. The assessment takes approximately 30 minutes to complete, and can be administered by an occupational therapist. Materials required include self-report form, informant report form and summary/profile forms for each. The assessment kit costs \$226.00. Additional information on this assessment can be found at [www.parinc.com](http://www.parinc.com).

### Useful Field of Vision/View (UFOV)

The UFOV has strong predictive validity for crashes and driving evaluations. This assessment specifically separates selective and divided attention and is strongly correlated with Trailmaking Part B. This assessment costs \$800.00 for the software, and a maintenance contract of \$250.00. The assessment has primarily been used with older adults and some studies have been conducted with participants with developmental disabilities. The website advertises that this assessment is less expensive, quicker and easier to administer than simulators or on-the-road evaluations. For more information on or to purchase this assessment, please see the following site: [www.visualawareness.com/Pages/ufov\\_pricing.htm](http://www.visualawareness.com/Pages/ufov_pricing.htm)

### OT- Driver Off-Road Assessment Battery (OT-DORA)

The OT-DORA is a compilation of multiple assessments, with the intended use to screen a driver who may need referral for comprehensive driver evaluation, screening young adults with disabilities to determine if learning to drive may be a realistic goal, or evaluate a driver's skills to determine if the driver can proceed to on-road testing, with minimal risk and expense. The assessment can be done in a quiet environment and clinical setting. The average time for administration is 90 minutes and can be administered by a certified driving rehabilitation specialist or an occupational therapist. This assessment is best suited for populations ages 16-80. The OT-DORA has specifically been administered to older adults with dementia and mild TBI patients. For more information, or to obtain the OT-DORA Battery, the Battery is published by the American Occupational Therapy Association (AOTA) Press and can be ordered online at the AOTA online store. Please visit [http://myaota.aota.org/shop\\_aota/prodview.aspx?TYPE=D&PID=87188032&SKU=1261](http://myaota.aota.org/shop_aota/prodview.aspx?TYPE=D&PID=87188032&SKU=1261)

### Rookwood Driving Battery

The use of this assessment is to understand the basic cognitive functions essential for safe driving. The domains of functioning assessed include visual perception, praxis skills, and executive function. Each of the skills tested relate to the client's ability to move a car in space and act appropriate in on-road traffic. This assessment has been used with populations that have had any neurological condition that affects brain functioning and older adults. It takes approximately 30-40 minutes to administer and can be administered by any therapist participating in a driving assessment. Administering this assessment can help decide whether an on-road test is warranted. Information on this assessment can be found at [http://www.pearsonclinical.co.uk/AlliedHealth/AdultAssessments/Cognition/RookwoodDrivingBattery \(RDB\)/RookwoodDrivingBattery \(RDB\).aspx](http://www.pearsonclinical.co.uk/AlliedHealth/AdultAssessments/Cognition/RookwoodDrivingBattery(RDB)/RookwoodDrivingBattery(RDB).aspx)

## Cognitive Assessments

### Mini-Mental State Examination (MMSE) 2<sup>nd</sup> Edition (1975)

This is a standardized questionnaire of cognitive performance. It is intended for clinical use in routine and serial examinations of mental status. This assessment has typically been used with adult populations with diagnoses such as psychiatric, neurological and general medical conditions. Materials needed for the assessment are the questionnaire, wristwatch, pencil, four sheets of plain blank paper. This assessment is included in the several battery of tests included in this resource guide. The assessment is available in three different forms: standard, brief, or expanded versions. The assessment takes approximately 15 minutes to complete, and can be administered by an occupational therapist. The assessment costs \$155.00 for the Standard Version, and is available in many different languages. Additional information on the assessment can be found at <http://www4.parinc.com/Products/Product.aspx?ProductID=MMSE-2>.

### Symbol Digit Modality Test

This is a standardized, speech, and executive functions and attention skills with the highest possible score of 110. Overall, the assessment detects cognitive impairment in less than 5 minutes. It can be used with individuals 8 years old and older. The assessment can be used with anyone, as individuals are able to give either a written or a spoken response. The SDMT is relatively culture-free and can be administered to those who do not speak English. The assessment has been used with individuals with TBI depression, dementia, Huntington's disease, and learning disorders. The full kit itself costs approximately \$118.00, which includes test forms and manual. For additional information, or to purchase this test, please see the following site: [www.wpspublish.com/store/p/2955/symbol-digit-modalities-test-sdmt](http://www.wpspublish.com/store/p/2955/symbol-digit-modalities-test-sdmt)

## **Motor Planning Assessments**

### Bruininks-Oseretsky Test of Motor Proficiency (BOT-2)

The use of this assessment is to understand the gross and fine motor function capacities and abilities of the individual. It is designed to be used by therapists, educators and researchers. This assessment is appropriate for children ages 4 – 21. The assessment is divided into 8 subtests: fine motor precision, fine motor integration, manual dexterity, bilateral coordination, balance, running speed and agility, upper limb coordination, and strength. The assessment has been used with individuals with typical developmental capacities, as well as individuals with disabilities who are able to follow directions. It takes approximately 50-70 minutes to administer the long form, and 20 -25 minutes to administer the short form. The assessment costs \$200.00. Administering this assessment can help decide whether an on-road test is warranted and the individual's driving readiness capacities. The test kit contains most test items, administration easel, and record forms. However, the examiner is required to provide a stopwatch and tape measure. Information on this assessment can be found at [www.pearsonassessments.com](http://www.pearsonassessments.com)

## **Visual-Motor Integration/Perception Assessments**

### Test of Visual Perceptual Skills – 3

This assessment is used to assess visual-perceptual skills without requiring motor response. It typically is used for screening and diagnostic purposes. The assessment can be used with ages 4 -19 and takes approximately 30-40 minutes to administer, with 10 minutes to score. The assessment should take place in a distraction free environment. The kit contains a test manual, test plate book, and scoring record forms. The assessment is made up of seven subscales: Visual Discrimination, Visual Memory, Spatial Relationships, Form Constancy, Sequential Memory, Figure-Ground, and Visual Closure. This assessment costs \$175.00. Information regarding this assessment can be found at [www.academictherapy.com](http://www.academictherapy.com)

### Beery-Buktenica Developmental Test of Visual-Motor Integration (Beery VMI)

The use of this assessment is to assess the extent to which people can integrate their visual and motor abilities. It can be used with populations ages 2 -18 for the full form. The assessment takes approximately 10-15 minutes for the 30-item form, and approximately 10 minutes to score. Location of the assessment should be a distraction-free environment that is well lighted and that includes a tabletop to complete. The kit includes the manual, test booklets, motor coordination booklets, visual perception booklets, a ruler and a protractor. The assessment consists of developmental sequence of geometric forms, graded from simple to complex, that are copied with pencil and paper. Two versions of the Beery VMI-5 are available. Two additional optional subtests – the Beery VMI- Visual Perception test and the Beery VMI-5 Motor Coordination test – accompany the instrument. This assessment can be used to identify individuals who may be encountering difficulties with visual-motor integration and decide if further testing or additional referrals are needed. The assessment can be administered individual or in a group. This assessments costs \$296.00. Information on this assessment can be found at [www.pearsonassessments.com](http://www.pearsonassessments.com)

### Clock Test

This assessment is used as a clinical screening task of visuospatial and constructional disabilities to measure impairment. It is usually involved in the battery of tests mentioned in the above assessments. This assessment has typically been used with older adults suspected of having neurological or perceptual impairments, ages 65 to 85. The assessment takes approximately 5 minutes to administer and 5 minutes to score. Specific tools needed include the manual, scoring forms, blank paper and pencil. The assessment is free online. Additional information on this assessment can be found at [www.mhs.com](http://www.mhs.com)

## Self-Perception Assessments

### Self-Perception Profile for Adolescents

This assessment is used to provide profiles of individual's perceived competencies and adequacies across different domains and an assessment of global self-worth. It can be administered to individuals ages 13-17. The assessment takes approximately 20 minutes to administer a forced-choice questionnaire. It can be administered individually or in groups. The kit includes manual, questionnaire, pencil and teacher rating scale for child version. Forty-five items address Job Competence, Close Friendships, Romantic Appeal, Athletic Competence, Physical Appearance, Social Acceptance, Behavioral Conduct, and Self-Worth. This assessment is free and can contribute to determining the maturity levels of individuals in their readiness to begin driving. Information on this assessment can be found at [www.du.edu/psychology/people/harter.htm](http://www.du.edu/psychology/people/harter.htm).

### General Self-Efficacy Scale (GSES)

This assessment is used to assess an individual's perceived personal competence to deal effectively with a variety of stressful situations. It can predict the subject's ability to cope with daily hassles and adaptation after stressful events. Individuals learning to drive may have multiple stressors. The assessment takes less than 10 minutes to administer and can be administered by an occupational therapist. It has typically been used with individuals ages 12 or older. Items needed for this assessment consist of item list, pencil and paper. The assessment is free to download. This assessment can help facilitate goal setting, improve successful coping and promote changes in quality of life. Additional information can be found at [www.healthpsych.de](http://www.healthpsych.de).



## Assessments of ADLs and IADLs

### Elemental Driving Simulator (EDS) and Driving Assessment System (DAS), 2<sup>nd</sup> edition

This assessment is used to assess cognitive abilities necessary for safe driving and to demonstrate them to the client sufficiently to promote correct decisions on where and how to continue driving. These off-road assessments offer risk-free feedback to the client and others on complex driving capabilities. This assessment can be administered to individuals in their late teens to mid-80s. The assessment has been tested with cognitively at risk drivers such as older drivers, persons recovering from head injury or stroke as well as without neurological diagnoses. Areas assessed include steering control, speed of reaction, field of vision, adjusting, self-control, and consistency. Cut off scores are established to determine safe driving. The EDS takes approximately 20 minutes to administer and 1 hour for the DAS. Materials needed consist of the hardware that operates with an IBM or compatible computer and uses a steering console with a pedal floor plate and switch to access the personal computer. Computer software is also required for task presentation and analysis, and handbook. The individual undergoes a vision screening, motor function and neurological status assessment. Only an Occupational Therapist or Occupational Therapy Assistant is able to administer this assessment. This assessment provides information on recommendations for further testing, training, or vehicle modifications. The assessment costs \$3495.00 + \$75.00 for shipping and handling. Information regarding this assessment can be found at <http://lifesciassoc.home.pipeline.com>

### Assessment of Driving-Related Skills (ADReS)

A battery of performance-based tasks. This assessment takes approximately 15 minutes to administer. The performance tasks are conducted to measure vision, with confrontation and acuity, motor skills by ambulation, range of motion, strength and manual muscle testing and cognitive by Clock Drawing test and Trailmaking Test, Part B. This assessment has typically been performed with older adults, ages 65 to 80. The tests can be administered by an occupational therapist, or certified driving specialist. Information regarding this assessment can be found at [http://www.nhtsa.gov/staticfiles/traffic\\_tech/tt389.pdf](http://www.nhtsa.gov/staticfiles/traffic_tech/tt389.pdf)

### DriveABLE

A computer-based assessment and standardized road course. The assessment takes approximately one and a half to two hours to administer. The assessment is designed to measure motor speed and control, span of attentional field, spatial judgment and decision-making, speed of attentional shifting, executive function, and identification of driving situations. A preset algorithm determines results such as safe to drive, unsafe to drive, or suggests a road test. A standardized road test, designed by the test developer, is completed, and a final determination about driving is made. For additional information on this assessment, please visit: [www.driveable.com](http://www.driveable.com)

### RoadWise Review

Computer-based and performance based battery of tests including measure of visual acuity, leg strength, stamina, head and neck flexibility, short-term and working memory, visualization of missing information, visual search with divided attention, and visual information processing speed. This assessment is appropriate for first-tier screening for fitness to drive. The assessment has typically been used with older adults. The individual is able to take this assessment on his or her own. The software contains the free Driving Health Inventory. Additional information can be found at any local American Automobile Association (AAA) office or <https://www.aaafoundation.org/roadwise-review-online>

#### WayPoint

A paper and pencil test with a computer based version also available that is similar to Trailmaking Test, Part B, with visual distracters on the last trial. The assessment measures a driver's risk of having preventable and non-preventable motor vehicle crashes. The assessment profiles driving habits, strengths, and weaknesses as well as suggests countermeasures for collision avoidance. For additional information visit: [www.waypointresearch.com](http://www.waypointresearch.com)

#### driVR Rehab System

A computer-based virtual reality performance task is a computer-based steering wheel console, and foot pedal controls to assess client's potential for driving in real driving environments. Clients must wear virtual reality equipment, including goggles and headphones, to participate in assessment. For additional information on this website, visit: [www.drivr.com](http://www.drivr.com)

#### Driving Health Inventory

A computer-based and performance-based task conducting a battery of tests. The measures include visual acuity, leg strength and stamina, head/neck flexibility, short-term and working memory, visualization of missing information, visual search with divided attention, and visual information processing speed. The assessment is either \$10.00 per assessment or \$500 for licensing rights. This assessment is appropriate for first-tier screening for fitness to drive. For additional information on this assessment visit: [www.drivinghealth.com](http://www.drivinghealth.com)

#### Vericom Reaction Timer

A computer-based performance task that measures client perception and both simple and complex reaction time using visual aids on a computer screen. Clients are expected to react to the visual stimuli by braking or turning the steering wheel or both. The software and equipment needed costs \$575.00 Additional information can be found at [www.vericomcomputers.com](http://www.vericomcomputers.com)

## **On-road Evaluations**

On-road evaluations should be determined by the client's goals. Two ways to approach on road evaluations are following a standard route or a specialty route. A standard route is typically two to three hour route in all areas such as rural, residential, commercial, and highway. It should be at least 50 minutes minimum on the road. A specialty route is preplanned routes with directions, such as from the house to the grocery store. Common practices with the routes and test procedures increase the reliability of outcomes. Try to follow a standard, predetermined, clear documented route. Score the predetermined aspects of behavior at predetermined points along the route. Include directions to the driver that are documented clearly in the same form each test. Make sure your assessment criteria is operationally defined and documented in specific terms and follow a closely defined scoring procedure. Lastly, include the details of extensive training of testers (Pellerito, 2006). Typical on-road evaluation components consist of basic operations in the vehicle, basic maneuvers in an empty parking lot, performing with minimal traffic or on rural roads, performing in moderate/heavy traffic, speed control, defensive driving, and navigation. The individual must have a license or learning permit with them. When scoring, look for a pattern of errors. More than three or general pattern of errors creates a severity of error. Observe if the individual can fix the error, or if they do better with training or their response to cues. While evaluating, it is important to determine bad habits as opposed to driving errors. Look for automatic responses to basic maneuvers and be sure to tell the individual how they are doing. Tell them what you would like improved, and explain errors immediately.

# Interventions

This section provides many examples of interventions that an OT may complete with a teenager who has ADHD and who wants to drive. In the description of the intervention, the title, purpose, and the price are listed.

### **Driver-ZED**

Simply put, driver-ZED is a computer-based DVD software program that helps novice drivers (teens) recognize and avoid driving hazards. “ZED” stands for Zero Errors Driving, where zero errors results in a perfect score of...well zero, for only \$29.95. Featuring live-action video, Driver-ZED® puts teens to the test in 100 highway, city, country and work zone scenarios. Most novice drivers would need about two years of actual driving to acquire these valuable experiences. The program features over 25 animated tips on important driving topics, such as zero tolerance laws and night driving. Enabled to run from a server on a Windows network, Driver-ZED® includes a self-contained teaching module for driving instructor use in the classroom, as well as parent and student guides. Sessions focus on education on the perceptual process and how it applies to driving tasks; education on perceptual habits; IPDE process; visual scanning habits; identification habits; concepts of traction, space, and visibility, analyzing and interpreting a perceived traffic scene; predicting actions of other road users; identifying conflict probabilities,; proper responses to problem traffic situations; identifying, evaluating, and deciding habit patterns; and timing, positioning, and communication exercises. For additional information on where to purchase this program, please see the following site:

<https://www.aaafoundation.org/store?button=item=detail&ID+114&storeid=1>

### **Supporting a Teen's Effective Entry to the Roadway (STEER)**

Supporting a Teen's Effective Entry to the Roadway (STEER) Program is a psychosocial intervention for teenage drivers with ADHD. This program is a multicomponent intervention that was developed to help families with a teenager with ADHD negotiate the transition to independent driving. Using the program allows the ability to measure driving behaviors such as hard breaking, top speed, the amount of time driving over 70 miles per hour, instances of abrupt and extreme acceleration, and whether the device is disconnected. Individuals participate in an 8-week program using the CarChipPro and TravelEyes global positional system (GPS) monitoring device. The intervention is parent-teen focused on improving outcomes for adolescent drivers with ADHD. During each week, sessions are divided into two, 45-minute meetings with the first half including individual parent and teen meetings that occur in parallel and the second half including a joint activity. Specific components of the STEER program are as follows: motivational enhancement exercises, review of safe driving behaviors, effective communication and social skills, effective parental monitoring, contingency management, and communication skills, implementing a behavioral contract, driving simulation exercises, viewing three brief video vignettes. Current research is still being conducted on this intervention. However, results from Fabiano et al. (2011) indicate promising effects of the intervention. Most components of the STEER intervention can be implemented into the clinic setting with a computer. Clients can also purchase the on-board monitoring equipment for approximately \$100.00.

To find additional information on the research and feasibility of this intervention, please see the following article:

Fabiano, G. A., Hulme, K., Linke, S., Nelson-Tuttle, C., Pariseau, M., Gangloff, B.,... Buck, M. (2010). The supporting a teen's effective entry to the roadway (STEER) program: Feasibility and preliminary support for a psychosocial intervention for teenage drivers with ADHD. *Cognitive and Behavioral Practice*, 18(2), pp. 267-280.

### **Drive Smart**

Drive Smart is a free program, which allows you to practice your skills and become a more experienced and safer driver. The program takes you through a range of scenarios and quizzes where decisions are based on safe driving practices. The program is based on hazard perception training using simulation-based research. The program was developed in conjunction with an aviation and defense simulation developer. The program is based on three years of research by MUARC (the Monash University Accident Research Centre) using state of the art driving simulators. Session topics focus on seatbelt safety, driving conditions, how safe is your care, driving hours, and hazard perception training. Studies have shown that completing the Drive Smart program improves driving skills. Incentives for completing this program include the potential to win \$200 Coles Group and Myer gift voucher. Four vouchers are given away four times a year. For more information on this program, please visit the site: [www.tac.vic.gov.au/road-safety/learning-to-drive/drive-smart](http://www.tac.vic.gov.au/road-safety/learning-to-drive/drive-smart)

### **Commentary Driving**

Commentary driving involves drivers producing a running commentary on what they can see and what they are planning to do. This program technique has specifically been produced for the United Kingdom Police Academy. The program can be implemented by a certified driving instructor or certified rehabilitation driving specialist. The DVD program costs approximately \$35.00. Demonstrations are available on YouTube. The Ultimate Driving Craft DVD shows you how to apply commentary skills to your own driving. Commentary sharpens your observation skills so that using your eyes properly becomes a natural part of your driving. Ultimate Driving Craft 1 provides information on how to do commentary driving. Ultimate Driving Craft 2 supports slow motion and graphics. Ultimate Driving Craft 2 also shows how to achieve the correct speed before entering a bend. Additional information includes overtaking, city driving, motorways, country roads, bad weather driving, making safe progress, positioning and night driving. Ultimate Driving Craft 3 includes highlights of a 6-hour Hendon advanced car course route through five counties together with Chris Gilbert teaching commentary. Outcomes are more information, more time to assess, more time to act, superior hazard perception skills and unhurried polished driving. For more information on this program, please visit the site: [www.driving4tomorrow.com](http://www.driving4tomorrow.com)



### **The System Roadcraft: The Police Driver's Handbook- driver coaching**

The System Roadcraft is a driver coaching situation awareness and is a response driver-training course created by the United Kingdom Police. The Roadcraft is a guide that incorporates current evidence-based best practice for police driver training. Information includes content on response driving and maneuvering at low speeds and information on common causes of collisions and damage, a driving self-assessment, illustrations and diagrams on key principles and techniques of better driving, four phase system of car control, core driving competencies and how to develop self-assessment skills to continuously improve driving abilities, and personal risk awareness and competence in handling your vehicle. This program manual is offered online as a PDF document and a purchase price of \$24.00. For additional information on this program, please see the following site: [www.slami.co.uk/Documents/ipsga.pdf](http://www.slami.co.uk/Documents/ipsga.pdf) or email [officialpubsonline@tso.co.uk](mailto:officialpubsonline@tso.co.uk).

### **Risk Awareness and Perception Training Program**

The RAPT program trains drivers to anticipate potential hazards in different roadway scenarios. Drivers have to adjust their driving style to become safer drivers. Younger drivers do not scan the road as effectively as older, experience drivers and do not adjust the way they are driving when approaching potentially dangerous situations. RAPT is a free, computer-based program on identifying dangerous traffic situations and based on the idea of hazard perception training. RAPT is designed to be run from a personal computer, and not from this web site. There is also a version of RAPT available for handout use. For access to downloadable manual, scenarios, and correct answers, please visit the following site: <http://www.ecs.umass.edu/hpl/software.html#RAPT>

### **Countdown2Drive**

A national education program designed to teach preteens and young teens about safe driving before they start to drive. This program is easy to use, web-based program designed to help parents discuss and reinforce key safety habits with their kids that can protect them when riding with other drivers. A key component of the program is a parent-child Passenger Agreement. Parents and their kids can use the free web tool to establish family rules and guidelines complete with rewards and consequences. The agreement reinforces important safety behaviors such as always wearing a safety belt, reducing driver distraction and checking in with parents regularly. This program currently does not have research to support its effectiveness. For more information, please see the following website:  
[www.safekids.org/getting-ready-drive](http://www.safekids.org/getting-ready-drive).

# Interdisciplinary Interventions

## **Driving Education**

Driving educators are often people employed by companies who teach those wanting to drive. Lessons while completing driver's education include information on the local and state laws, on how to drive a car, and what to do in specific situations (vehicle safety). Currently, there are many driving education courses online. Online courses may offer educational videos about how to drive a car in situations; examples given of situations include heavy traffic, construction, severe weather, etc. Other portions of the driving education as known as driver training include practice on-road driving in preparation for taking a learner's permit test and for the official behind-the-wheel driver's test. The practice on-driving portion of the education is often provided by a driving school and is completed with a driving instructor. Find your local driver's education center and more information about driving education at <https://driversed.com/>. For more information, please visit <https://driversed.com/north-dakota/traffic-school.aspx>.

## **Case Manager (optional)**

A case manager assists with setting up services and coordinating those services. They ultimately serve as a communication link. They also assist with funding sources and advocating for client. They can also assist with making to the appropriate driving rehab program based on cost and billing procedures, who the evaluator is, or what services are being provided and scheduling processes. A case manager may allow facilitate communication between school therapists, clinic therapists, and other healthcare professionals.

## **Physician**

In relation to driving, physicians should be aware of the American Medical Association guide for fitness to drive. This assessment, the Assessment of Driving Related Skills (ADReS), is typically used with screening older adults. However, if physicians and family practitioners are aware of the criteria in this assessment, individuals should be knowledgeable to make needed referrals to an OTR or driving rehab specialist. In addition, it is also the physician's role to discuss driving with the client. In doing so, the physician is educating the individual on the risks associated with driving, and certain performance areas where the individual may experience deficits or concerns for safety. It is also important for the physician to review effects of medications

in regards to driving. Some individuals participate in medication therapy where they supplement stimulants to modify behavior and increase attention and focus. In doing so, it is important for the physician to emphasize the importance of a medication schedule in relation to driving. Thus, making sure the individual is correlating when they are taking their medication with when they plan to drive. After educating the client, the physician may need to refer the individual for occupational therapy driver evaluation and training. In doing so, one can eliminate or minimize the impact of symptoms associated with ADHD and increase the individual's safety.

### **Parents' Role**

Parents' role consists of several components. First, the parent or guardian should give permission to attend. Next, the parent or guardian should assist in gathering information for evaluation as necessary. This includes participating in Driving History Questionnaires or additional behavior questionnaires. It is also the responsibility of the parent or guardian to assist in transportation and providing a support system for the client. Lastly, it is important to accept and reinforce recommendations to promote a more successful intervention outcome.

### **Certified Driver Rehabilitation Specialist (CRDS)**

The role of the driver rehab specialist is as follows: complete clinical evaluation and on the road evaluation, provide training and recommendations, educate on community resources and additional driving programs in the community, send final report to the physician, and complete 30 day and 1 year follow up calls. It is important to note, that a driver rehab specialist can be an OTR for clinical evaluation and on the road evaluation, and can implement the training. Alternatives can also be pursued where a driving instructor can perform the on the road evaluation and implement training as well. A certified driving rehab specialist can be an OTR, driving educator, driving instructor, or others. Certification can be obtained by a driving rehabilitation specialist by taking an exam and maintaining one's licensure through continuing education and practice. Certification is not mandatory, but strongly recommended by ADED.

### **Medication Therapy**

Stimulants, including methylphenidate and amphetamine, are the most widely researched and most commonly prescribed medications because of their calming effects

on individuals with ADHD (Biederman, Fried, Hammerness, Surman, Mehler, Petty, Farone, Miller, Bourgeois, Meller, Godfrey, & Reimer, 2012; Sobanski, Sabljic, Alm, Dittmann, Wehmeier, Skopp, & Strohbeck-Kühner, 2013; Visser, Danielson, Bitsko, Holbrook, Kogan, Ghandour, Perou, & Blumberg, 2014). Research has demonstrated that stimulants improve individuals' behaviors and academic performance by reducing hyperactivity and impulsivity and improving focusing abilities (Sobanski et al., 2013). Some individuals on medication may experience undesirable or negative side effects including decreased appetite, sleep problems and irritability. It is important to monitor these side effects as they may affect your child's ability to drive or safety on the road. For driving purposes, if an individual is taking a medication, it is important to ensure they are taking the medication enough time in advance for the medication to be fully in effect while driving.

### **Educational Management**

Interventions include maximizing attention and concentration, counter impulsive behavior, improve self-esteem and socialization, assist in overcoming learning difficulties, and promote consistency of management between home and therapists. Strategies to include are communicating folders between parents and therapists, making clear assignment guidelines and involving additional disciplines in the intervention team as needed.

### **Multimodal Treatment**

Multimodal Treatment is a combination intervention of both medication and behavioral therapy that has shown decreased in symptoms of anxiety and improved academic performance, familial relations, and social skills (MTA Cooperative Group, 1999). However, this treatment has yet to demonstrate research the shows long-term effects due to changes in medication regimens, age-related changes, familial factors, comorbid conditions, and initial symptom severity.

## Case Study

Here is a case study created by the authors of this resource manual that discusses and applies the various aspects from this resource manual.

Josh is a 15-year-old white male, living with his parents and four siblings and mainstreamed in the 9<sup>th</sup> grade. He has never had a learner's permit. Josh has a diagnosis of ADHD. He is receiving occupational and speech therapies between the ages of 5 and 11 years. Josh takes Amphetamine 10 mg 1x/day and reports no medication adverse effects. Josh is independent with dressing, grooming and bathing with cues for time management. Josh is independent in operating kitchen appliances and preparing light meals. Although he can do his laundry, he needs help with planning outfits and folding/putting away his clothes. Josh requires assistance to organize and sequence steps for completing assignments and requires total assistance from time management with schoolwork. In a community setting, he crosses the street independently and is able to find his way to locations. Josh completed a battery of tests indicating intact visual acuity, peripheral vision, depth perception, color discrimination and lateral and horizontal phorias. He also has intact central vision processing, divided visual attention, and selective visual attention skills. His overall ability to integrate visual information with a specific motor response was mildly impaired. Josh is mildly impaired with complex sequencing, has limitations in attention shifting and planning and shows difficulty with gross motor coordination and proprioception.

Josh's motor coordination for operating vehicle controls is adequate, but he still makes driving errors. He drifted beyond the limits of his lane multiple times on straight roads and during turns. Although lane maintenance errors are common among novice drivers, the frequency of Josh's errors and lack of awareness suggested significant impairments related to visual motor integration and attention shift. Josh did not perform visual scanning for traffic at cross streets and during lane changes. He approached all intersections with excessive speed, causing him to make wide turns to the right and encroaching into oncoming traffic on the left. Josh drove through two red lights and reported that he did not think it was necessary to stop, reflecting his poor understanding of traffic flow as a cause for collisions and inattention to adjustment to stimuli. Josh made two gap acceptance errors related to being overcautious, potentially due to being a novice



driver. Although he had severe difficulty with recognizing the divided attention symbols, his speed of response on the one divided attention task was good.

Josh's main impairments pertained to shifting his attention, visual motor integration and motor coordination. These impairments potentially limit his independence in life skills as well as driving.

The occupational therapist recommended enhancing life skill development prior to driver training. Essentially, Josh needs to demonstrate time management, or being able to be on time, by being able to demonstrate visual-spatial construction of the demands, using executive functions to make decisions, solve problems, and demonstrate praxis skills to adapt behaviors. This same skill set is important for safe driving performance as well. For example, to maintain speed, one must perceive the posted speed limit (sensory), kinesthetically experience the speed at which the vehicle is traveling, understand the rules of the road, and adapt motor responses accordingly. The occupational therapist also recommended interventions that would address his risk taking behaviors and impulsivity. It is important to prevent adverse outcomes by mitigating the risk taking behaviors prior to starting to drive. Therefore, a reasonable outcome may be to demonstrate responsible behaviors at home or during community activities without supervision. Community based goals can focus on pedestrian safety, by developing planning, attention shifting, social interaction, and visual-motor integration skills. Negotiating unstructured environments, such as parking lots, may improve Josh's capacity to anticipate traffic flow and predict behaviors of other road users.

Lastly, the occupational therapist recommending parent coaching intervention to help train him and educate them on the skill progression necessary for independence at home, in the community and eventually for driving. To become an independent driver, it is important his skills are developed first to show competence in ADLs and IADLs. From here, driving education or rehabilitation training can take place based on his choice.

## Additional Resources for Clinicians

## Service Delivery Models for Driving

These pages are intended to provide occupational therapists with information about models that would support the development of a driving program.

### Traditional Medical Model

- Takes place in a hospital, rehabilitation center or free-standing clinic
- May or may not be licensed by the state as a driving school
- Use of clinical reasoning based on evidence based practice
- Requires prescription from physician
- Bills third party payers and/or fee for service

### Community-based Model

- Driving schools licensed by the state
- Employ driver educators, driving instructors, CDRS, and occupational therapist
- No prescription required (exception: OT operated independent entrepreneur for-profit driving program)
- Fee-for-service

### University Model

- State and/or federally funded (often grants)
- Located on a university campus or within university-affiliated teaching hospital
- Employ occupational therapist, driving instructors and CDRS
- Requires prescription from physician
- Focus on research and education

## Setting up Referral Pathways

These pages are intended to provide occupational therapists with information about setting up referrals for a driving program.

One key to success of driving rehabilitation is building a reliable, sustainable network of referral sources.

Individuals with ADHD may not be seeing occupational therapists within the school system, in order to address fitness to driving or driving readiness skills. It is important to discuss with this population, what OTs are capable of doing and explaining why and how teen driving safety and the impact of ADHD affect the community. The following sections provide tips for building referral pathways, a list of stakeholders and organizations, as well as resource handouts for physicians and families in creating referral pathways.

### Pull Together Basic Information

- Create a fact sheet summarizing your services and other community-based resources
- Describe the range of services your program offers. Do you conduct clinical driving assessments and refer clients to other full
- Provide information on education programs in the community

### Educate the Therapy Staff in Your Facility

- Conduct focused discussion groups. Invite staff from area clinics and therapy programs to meet. Explore all the ways teen drivers can access various services, effective ways to disseminate information to clients and staff, and the ways staff can easily refer clients to rehab.
- Define your services and your community's resource network

### Conduct Community-Based Education with Clients and Potential Professional Referral Sources

- Meet with family practitioners and general physicians to discuss the impact of driving on the quality of life and activities of daily living

- Meet with consumer support groups that represent the concerns and needs of individuals with particular diseases or conditions (i.e. National Institute for Mental Health).

#### Establish Relationships with Print and Broadcast Media

- Serve as a credible, trustworthy, available information resource to comment on breaking news stories about teen drivers and other mobility issues.
- Contact local TV and radio channels to have community public events shows. Educate show producers about the impact of teen driver safety and issues on the quality of life in your community

#### Create Marketing Handouts

- Consider distributing items such as pens, key chains, sticky notes, and magnets with your referral information. Include department phone number and Web address on items.
- Create a brochure with the departments name and contact information and the services you provide

#### Present at Conferences and Meetings

- Consider presenting at local, county, or state health care associations such as the state medical association and state occupational therapy association

#### Do Targeted Mailings

- Mail brochures and other materials to potential referral sources such as developmental optometrists, family practitioners, general physicians, psychologists, and inpatient and outpatient rehabilitation centers.
- Include in your mailing, in addition to fact sheet, one or more items addressing tips for safe driving, or additional brochures.

#### Evaluate the Impact of Your Marketing Efforts

- Ensure that your time and other resources are well used.
- Ask clients how they heard about the services and why they decided to use your services.

## Partner Organizations and Stakeholders

Below is a list of organizations and stakeholders that may be reliable and sustainable referral sources for future driving programs or for community based programs as well. These pages are intended to provide occupational therapists with information about partner organizations and stakeholders that would be beneficial to explore during the development of a driving program.

- AAA Foundation for Traffic Safety - Dedicated to identifying traffic safety problems, foster research that seeks solutions, and disseminate information and educational materials.
- AAA (American Automobile Association) - Provides general information to help drivers better understand the traffic safety implications of certain health conditions and human behaviors
- American Association of Motor Vehicle Administrators (AAMVA) - Represents and serves the motor vehicle and law enforcement agencies and the private sector to advance driver license, vehicle title, motor carrier, highway safety, security, identification, and enforcement practice.
- American Driver and Traffic Safety Education Association (ADTSEA) – support driving educator professionals to develop and promote a level of excellence among driver education in the delivery of instruction to the novice driver. Educate individuals in traffic safety strategies, which is an integral part of the nation’s highway safety plan. Goals include professional development, program development, and creating professional partnerships.
- The Association for Driver Rehabilitation Specialists (ADED) - Support professionals working in the field of driver education / driver training and transportation equipment modifications for persons with disabilities through education and information dissemination.
- ADHD Online Community – Provides resources for family, adults with ADHD, and health care professionals. Please visit <http://adhd.com>
- American Medical Association (AMA) - Promote the art and science of medicine and the betterment of public health by improving health outcomes, accelerating

change in medical education, and professional satisfaction and practice sustainability.

- Centers for Disease Control and Prevention - provides resources for families, adults with ADHD and healthcare professionals for education and research purposes.
- Driving School Association of the Americas (DSAA) - an international association of driving school owners. From all over, the globe educators come to associate with like-minded professionals.
- Insurance Institute for Highway Safety - Scientific and educational organization dedicated to reducing the losses; deaths, injuries, and property damage from crashes on the roads.
- National Highway Traffic Safety Administration (NHTSA) - Offers guidelines based on best practices around the country and include countermeasures that can be implemented to ensure the safety of drivers, including at-risk drivers; and encourage state-highway safety officers to work closely with driver license officials, state departments of transportation, medical providers and aging services providers, among others.
- National Institute for Mental Health – offers education and resources to individuals with ADHD and families. In addition, a research institute that offers insight into best practice and evidenced based practice interventions to insure the overall health and quality of life of individuals.

## Resources for Teen Drivers, Families, and Communities

These pages are intended to be duplicated and distributed by occupational therapists to families, parents, and teens with information about various resources available to support the teenager before, during, and after driving.

American Occupational Therapy Association – Driver Safety

[www.aota.org/practice/children-youth/emerging-niche/driving-for-teens.aspx](http://www.aota.org/practice/children-youth/emerging-niche/driving-for-teens.aspx)

AAA Foundation for Traffic Safety

1-202-638-5944

[www.aaafoundation.org/teen-drivers](http://www.aaafoundation.org/teen-drivers)

National Highway Traffic Safety Administration

1-888-327-4236

[www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)

American Association of Motor Vehicle Administrators (AAMVA)

1-888-472-6303

[www.aamva.org](http://www.aamva.org)

Association for Driver Rehabilitation Specialists (ADED)

1-866-672-9466

<http://www.aded.net>

American Automobile Association – Teen Driving

<http://teendriving.aaa.com/ND/>

Safe Kids Worldwide

[www.safekids.org/getting-ready-drive](http://www.safekids.org/getting-ready-drive)

General Motors and the General Motors Foundation

[www.gm.com/gmfoundation](http://www.gm.com/gmfoundation)



## Resources for Physicians

These pages are intended to be duplicated and distributed by occupational therapists to physicians and other referral sources with information about various resources available to support the teenager before, during, and after driving.

### Occupational Therapists

#### OT Services

- Conduct clinical driving assessments, including behind-the-wheel, on-road and off-road assessments
- Provide appropriate driving interventions and clinical remediation services
- Provide appropriate referrals if needed to developmental optometrists, physical therapy, and speech therapy.

#### Other Driving Education Programs

- Driver-Zed
- Supporting a Teen's Effect Entry to the Roadway (STEER)
- Drive Smart
- Commentary Driving Interventions
- Risk Awareness and Perception Training Program

Reporting Requirements—[www.mass.gov/rmv/medical/reporting.htm](http://www.mass.gov/rmv/medical/reporting.htm)

Information for physicians—[www.mass.gov/rmv/seniors/physicians.htm](http://www.mass.gov/rmv/seniors/physicians.htm)

### Teen Driver Safety

Keating, D. (2007). Understanding adolescent development: Implications for driving safety. *Journal of Safety Research*, 38, 147-157.

Williams, A. F. (2003). Teenage drivers: patterns of risk. *Journal of Safety Research*, 34, 5-15.

Strzelecki, M. (2011). Green light go: Helping teens with disabilities take the wheel. *OT Practice*, 16(2), 8-19

ADED. (2015). ADHD and Driving Fact Sheet. Retrieved from:

[http://c.ymcdn.com/sites/www.aded.net/resource/resmgr/Fact\\_Sheets/ADED\\_Fact\\_Sheets\\_ADD\\_ADHD.pdf](http://c.ymcdn.com/sites/www.aded.net/resource/resmgr/Fact_Sheets/ADED_Fact_Sheets_ADD_ADHD.pdf)

National Highway Traffic Safety Administration (NHTSA)

*Teen Driver Crashes: A Report to Congress* h

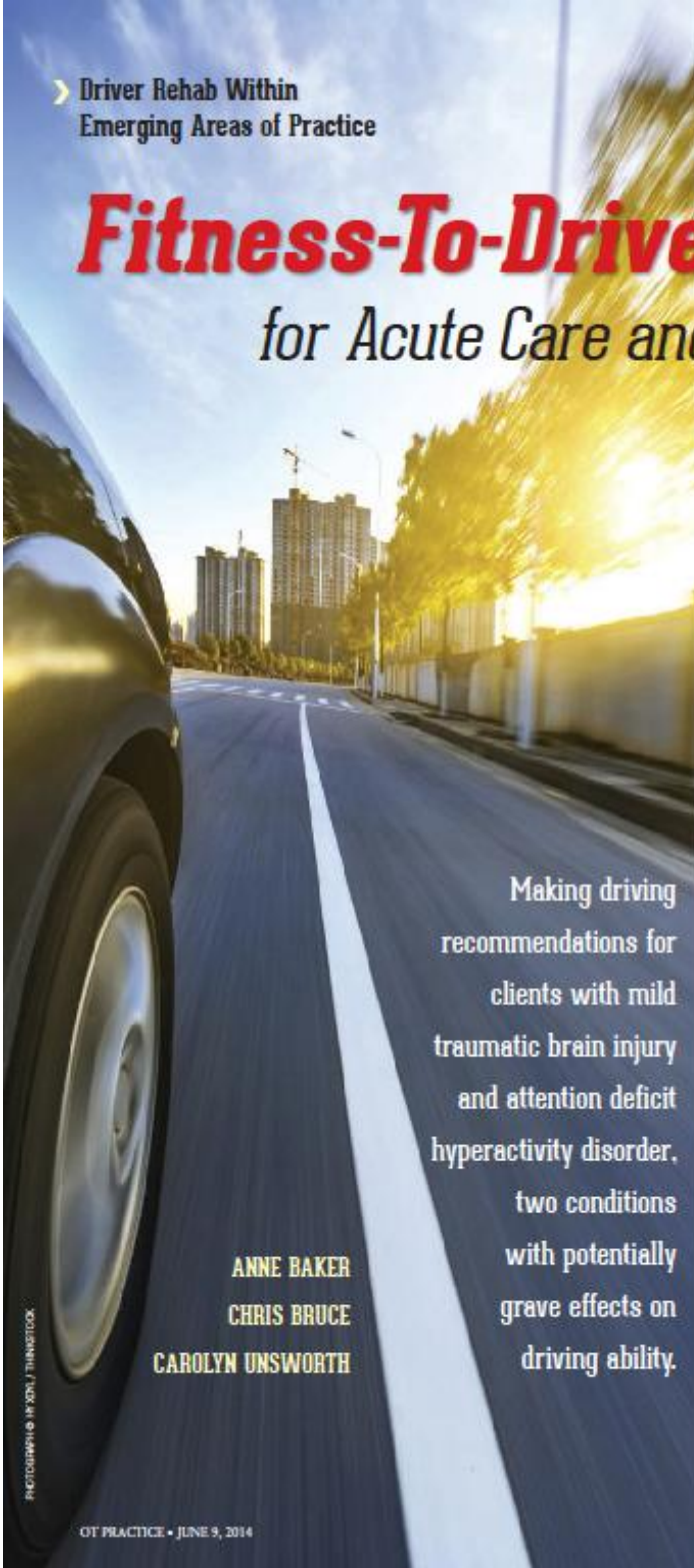
<http://www.nhtsa.gov/DriverEducationProgram>

*Visual Search/Perception Fact Sheet* <http://www.nhtsa.gov/DriverEducationProgram>

*Risk Management Fact Sheet* <http://www.nhtsa.gov/DriverEducationProgram>

National Center for Statistics and Analysis. (2013a). *2011 young drivers traffic safety fact sheet* (DOT-HS-811744). Retrieved from

<http://www.nrd.nhtsa.dot.gov/Pubs/811744.pdf>



➤ Driver Rehab Within  
Emerging Areas of Practice

# ***Fitness-To-Drive Decisions*** *for Acute Care and ADHD*

**ANNE BAKER  
CHRIS BRUCE  
CAROLYN UNSWORTH**

**PHOTOGRAPH BY KYLE J. THINNETT**

**OT PRACTICE • JUNE 9, 2014**

Making driving  
recommendations for  
clients with mild  
traumatic brain injury  
and attention deficit  
hyperactivity disorder,  
two conditions  
with potentially  
grave effects on  
driving ability.

**Ensuring Optimal Fitness-To-Drive  
Recommendations**

Occupational therapists who specialize in driver rehabilitation face the complex yet important task of assessing fitness to drive. A comprehensive driver evaluation (CDE), which provides the best evidence of fitness-to-drive for those with chronic and long-term health conditions, involves a clinical (off-road) assessment, followed by an in-vehicle (on-road) assessment. The off-road assessment is used to screen the driver's physical, sensory, cognitive, perceptual, and behavioral abilities in order to

**D**riving a car is an essential instrumental activity of daily living for most adults in Western societies. A majority of American adults of all ages elect to drive, even in public transport-friendly cities, because driving promotes independence; the driver can come and go when preferred, on the exact route selected, allowing for rest as desired. Driving is viewed by many as an everyday necessity, and a fundamental right. Internationally, there also seems to be a preferred tendency to drive as the primary means of transport. Although the terminology associated with driving and the systems that facilitate driving may differ from country to country, the practice of occupational therapy in this domain remains essentially the same. Therefore, when questions arise about a person's ability to drive safely or learn to drive because of a disability or health concern, it is important that we approach these questions in a standardized, evidence-based manner so that optimal recommendations concerning fitness-to-drive can be made. As more people are living longer and healthier with a wide range of disabilities that may challenge the skills and abilities required for safe driving, occupational therapists have the opportunity to become integrally involved in the steps of both comprehensive driver evaluation and intervention.



## Case Example: Tyler

**T** Tyler was a 21-year-old male rugby player. Knocked unconscious for 5 minutes during a game, he vomited on waking and presented as very confused to his teammates. Tyler was taken to the local hospital, waited approximately 8 hours in the small emergency department, and was briefly admitted before being discharged home without any recommendations about when it would be suitable for him to return to his usual activities, such as working or driving. The following Monday morning, Tyler returned to his job in a large warehouse and worked a typical 10-hour shift. Throughout this shift, Tyler experienced common symptoms associated with mTBI, including headache, dizziness, nausea, fatigue, and trouble concentrating. Tyler drove home from work as usual. The next thing Tyler remembered was a car loudly beeping its horn, as Tyler had swerved his car into the oncoming traffic. Shaken, Tyler pulled over and called his mom, who took him to a major trauma hospital. Tyler was thoroughly examined by a multidisciplinary team. The occupational therapist, as well as other medical staff, provided written and verbal education regarding when it was suitable for Tyler to return to his daily activities. The occupational therapist recommended that Tyler not drive for 2 weeks, as he had sustained an mTBI.



➤ The next thing Tyler remembered was a car loudly beeping its horn, as Tyler had swerved his car into the oncoming traffic.

The recommendation in this particular fitness-to-drive scenario is based on a standardized clinical protocol that is used with mTBI patients at some trauma hospitals, as discussed by Moore and Leatham (2004). Recognizing the lack of evidence available to support fitness-to-drive recommendations after mTBI, clinical protocols such as this were developed based on extensive multidisciplinary team discussions, and input from experts in the field, who reasoned that patients should be fit to return to driving at 2 weeks post-injury (given that symptoms rapidly improve within 1 to 2 weeks after an mTBI). At a 3-month follow-up phone call from the occupational therapist, Tyler stated that he had successfully returned to driving after his 2-week "ban," with no flare up of mTBI symptoms. Tyler mentioned that the advice he had received from the occupational therapist at the trauma hospital about alternative means of transport was especially helpful in fulfilling his usual occupations and maintaining his independence while he wasn't able to drive. The occupational therapist had offered Tyler maps, links to useful transportation websites, and telephone numbers for taxi services, which Tyler found beneficial.

ensure that he or she is functionally fit to proceed to on-road testing. Standardized off-road assessments include the Occupational Therapy Driver Off Road Assessment (OT-DORA) Battery (Unsworth, Pallant, Russell, & Odell, 2011) and the Rookwood Driving Battery (McKenna, 2009), which consist of neuropsychological tests designed to evaluate cognitive, physical, and sensory functions essential for safe driving. Together with the on-road assessment, these off-road assessment results are used to formulate recommendations to medical and/or licensing authorities about fitness-to-drive. For these recommendations to be optimal, clinicians in driver rehabilitation must select off-road assessments and on-road protocols that are standardized, reliable, and valid to guide their clinical reasoning. This can be difficult if clinicians find themselves working with populations that have not traditionally received services related to driving. This article details two such populations: those in acute care following mild traumatic brain injury (TBI) and those with attention deficit hyperactivity disorder (ADHD), and it provides examples of innovative and evidence-based approaches to working with these client groups.

## Clients in Acute Care: What to Advise?

TBI is one of the leading causes of death and disability in adults of working age, and accounts for a high percentage of acute hospital admissions in the United States (McCrea et al., 2009). Mild TBI (mTBI) occurs most commonly, and it comprises 70% to 90% of all traumatic brain injuries sustained (Cassidy et al., 2004; although mTBI injuries may not necessarily account for the same percentage of persons with TBI receiving driver rehabilitation). Common characteristics of mTBI include confusion or disorientation after the event; reduced attention and concentration levels; and problems with organization, planning, and self-monitoring abilities. These symptoms are most pronounced 24 hours after an mTBI, rapidly improve within 1 to 2 weeks, and are usually fully resolved within 3 months post injury—although

PHOTOGRAPH BY SHARON K. MCKENNA / GETTY IMAGES AND PHOTOFEST / ISTOCKPHOTO



not for all, as noted by McCrea et al. (2009). Individuals who are admitted to the acute care setting after sustaining an mTBI may be at an increased risk of being involved in motor vehicle accidents when they return to driving on discharge, due to the cognitive and physiological sequel of their injury, as discussed by Ortoleva, Brugger, Van der Linden, and Walder (2012). The time required for recovery from what is likely a short impairment hospitalization, and the need to live in the community as a non-driver for an extended time for recovery, can pose a challenge for mTBI patients. Occupational therapists may be consulted to provide advice on when and whether it is safe for someone with this condition to return to driving post-injury. Patients likely will return to driving, but not at discharge from the hospital. Predicting driving capacity after mTBI can be difficult.

For a case example, see page 8.

## Facilitating Learning to Drive for Clients With ADHD

Young drivers who are diagnosed with ADHD are at an increased risk for crash involvement and traffic violations, according to an evidence review presented by traffic researcher Truls Vaa at a 2012 workshop held by the International Cooperation on Theories and Concepts in Traffic Safety in Brussels. ADHD is a neurodevelopmental disorder associated with executive dysfunction and is characterized by poor sustained attention, impulsiveness, and hyperactivity. ADHD is a common condition, with a U.S. prevalence of around 5%, according to the American Psychiatric Association. Generally speaking, international licensing jurisdictions do not explicitly list ADHD as a medical condition requiring assessment for fitness-to-drive, with the exception of Australia and Canada. In Australia, if an individual is prescribed stimulants (e.g., dexamphetamine) for treating ADHD, the driver licensing authority needs to be informed in case the person is subject to random drug testing when driving. This ensures that the driver is not wrongfully accused of taking illegal drugs or taking prescribed drugs counter to recommended usage.

Figure 1.

### Examples of Inexpensive Interventions With Good Clinical Utility That Could Be Used With Drivers With ADHD

- ▶ **Commentary Driving (\$35)**—Involves drivers producing a running commentary on what they can see and what they are planning to do. This is used in the United Kingdom for police driver training. See [www.driving4tomorrow.com](http://www.driving4tomorrow.com).
- ▶ **The Risk Awareness and Perception Training Program (free)**—A computer-based hazard perception training intervention. See [www.ecs.umass.edu/hpl/software.html#RAPT](http://www.ecs.umass.edu/hpl/software.html#RAPT).
- ▶ **DRIVER-ZED (\$30)**—A PC-based hazard perception training program. See [www.driverzed.org/home](http://www.driverzed.org/home).
- ▶ **The System (\$24)**—This is a one-to-one advanced driver coaching system based on the “information, position, speed, gear, and accelerate system” of car control. See [www.slam-iam.co.uk/Documents/ipsa.pdf](http://www.slam-iam.co.uk/Documents/ipsa.pdf).

However, assistance is not routinely provided to help these individuals obtain their driver's license, or to improve their driving skills.

One critical area where we know these drivers have difficulty is identifying dangerous traffic situations (hazard perception), as noted by Preece, Horswill, and Geffen (2010). Improving hazard perception skills in novice drivers with ADHD has the potential to decrease their crash and traffic violation rates, according to Barkley (1997). Although there is some research to support the effectiveness of hazard perception training among typically developing young adults, there is almost no research to support the practical

training of young adults with ADHD to improve their hazard perception. There are a number of empirically supported interventions that could be used with this group of drivers to improve hazard perception skills. Although some are laboratory based or prohibitively expensive (as they require the use of driving simulators or closed driving courses), a number are free or relatively inexpensive (see Figure 1).

Although there is limited evidence concerning the effectiveness of interventions to help drivers with ADHD, two trials are underway in this area. First, research is investigating the “Supporting a Teen's Effective Entry to the Roadway (STEER) Program,” which



A video risk assessment tool under development for use in the forthcoming ADHD Drive Smart RCT.



## FOR MORE INFORMATION

**Driving and Community Mobility Resources**  
[www.aota.org/olderdriver](http://www.aota.org/olderdriver)

**Critically Appraised Topic**  
**Driving and Community Mobility for Older Adults**  
[www.aota.org/-/media/Corporate/Files/Secure/Practice/CCL/DD/Driving-Person.pdf](http://www.aota.org/-/media/Corporate/Files/Secure/Practice/CCL/DD/Driving-Person.pdf)

**Fact Sheet**  
**The Occupational Therapy Role in Driving and Community Mobility Across the Lifespan**  
[www.aota.org/About-Occupational-Therapy/Professionals/PAFacts/Driving-Community-Mobility](http://www.aota.org/About-Occupational-Therapy/Professionals/PAFacts/Driving-Community-Mobility)

**AOTA CD or Online Format Course**  
**(ADED-APPROVED)**  
**Creating Successful Transitions to Community Mobility Independence for Adolescents: Addressing the Needs of Students With Cognitive, Social, and Behavioral Limitations**  
 By M. Monahan & K. Patten, 2009. Bethesda, MD: American Occupational Therapy Association. (Earn 7 AOTA CEU [8.75 NBCOT PDU, 7 contact hours]. CD: \$98 for members, \$140 for nonmembers. Order # 4833. Online: \$88 for members, \$130 for nonmembers. Order # OL4833. To order, call toll free 877-404-AOTA (2682) or shop online at <http://store.aota.org>, and enter order # preferred.)

**AOTA Self-Paced Clinical Course (ADED-APPROVED)**  
**Driving and Community Mobility: Occupational Therapy Strategies Across the Lifespan**  
 By M. J. McGuire & E. S. Davis, 2010. Bethesda, MD: American Occupational Therapy Association. (Earn 2 AOTA CEUs [25 NBCOT PDUs, 20 contact hours]. \$259 for members, \$359 for nonmembers. To order, call toll free 877-404-AOTA (2682) or shop online at <http://store.aota.org>, and enter order #3031.)

**Driver Rehabilitation Across Age and Disability: An Occupational Therapy Guide**  
 By S. Redepenning, 2006. Bethesda, MD: AOTA Press. (\$39 for members, \$55 for nonmembers. To order, call toll free 877-404-AOTA (2682) or shop online at <http://store.aota.org>, and enter order #1237.)

**Driver Rehabilitation and Community Mobility: Principles and Practice**  
 Edited by J. M. Pelletto, 2006. St. Louis, MO: Mosby.

**OT-DORA: Occupational Therapy Driver Off-Road Assessment Battery**  
 By C. A. Unsworth, J. F. Paltani, K. J. Russell, & M. Odell, 2011. Bethesda, MD: AOTA Press. (\$99 for members, \$140 for nonmembers. To order, call toll free 877-404-AOTA (2682) or shop online at <http://store.aota.org>, and enter order #1261.)



involves combining parent training, communication training for families, and supervised practice in a driving simulator, as noted by Fabiano et al. (2011). Second, research is underway by co-authors Bruce and Unsworth to determine the effectiveness of a computer-based hazard perception training intervention called "Drive Smart," which uses simulation-based research and was developed in conjunction with an aviation and defense simulation developer. For more on this, see [www.tac.vic.gov.au/road-safety/learning-to-drive/drive-smart](http://www.tac.vic.gov.au/road-safety/learning-to-drive/drive-smart).

## Conclusion

As more people with disabilities wish to learn to drive or continue to drive, occupational therapists need to ensure that driving and community mobility assessments are included as part of routine instrumental activities of daily living evaluations. Clinicians working in areas of practice where driving has not traditionally been a focus face the difficult task of finding innovative and evidence-based approaches to working with these client groups. We encourage occupational therapists to collaborate with research colleagues so that cut-

ting-edge evidence can be developed and implemented in practice. ■

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**Anne Baker, BOccThy, Hons**, is currently completing her doctor of clinical science (occupational therapy) degree in the area of acute trauma and fitness-to-drive after mTBI. Baker is a qualified driver assessor.

**Chris Bruce** is a PhD student whose research is examining the use of behavioral interventions to reduce crash risk for young male drivers with ADHD. Bruce is also a qualified driver assessor.

**Carolyn Unsworth, PhD, OTL**, is a qualified driver assessor whose research and teaching interests are in the areas of driver assessment and rehabilitation, community mobility, outcome measurement, and clinical reasoning and decision making. Unsworth led a team of colleagues in developing the OT-DORA Battery.

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## Glossary

Certified driver rehabilitation specialist— an individual who meets the educational and experiential requirements and successfully completes the certification exam provided by the Association of Driver Rehabilitation Specialists (ADED, 2004).

Driver rehabilitation specialist— A specialist who “plans, develops, coordinates, and implements driver rehabilitation services for individuals with disabilities” (ADED, 2004).

Driver rehabilitation therapist— An allied health professional with specialized training, experience, and credentials in driver rehabilitation services, including evaluating and training people with disabilities in driving or safe transportation (Pierce, 2002).

Community mobility— “Moving self in the community and using private or public transportation, such as driving or accessing buses, taxi cabs, or other public transportation systems” (American Occupational Therapy Association, 2002, p. 620).

Driver educator— a professional with a college degree in education with specialized study in driver education or traffic safety.

Driver safety— operation of a motorized vehicle, with or without adaptive equipment, to travel in a safe manner in coordination with other drivers on public roadways to a desired destination.

Driving instructor— as required by many states, an individual with a high school degree and a clear legal and driving record who has completed a driver education training program and has been licensed as a driving instructor by the state motor vehicle administration.

Ecological validity— the degree to which standardized test results can be used to generalize and predict an individual’s performance in a naturalistic environment (Hart & Hayden, 1986).

Environmental scanning— A process of analyzing trends that allows decision makers both to understand the external environment and the interconnections of its various sectors and to translate this into planning and decision-making processes (Morrison, 1992).

Operational demands of driving— basic control of a motorized vehicle, such as steering, acceleration, and braking functions (Michon, 1979).

Strategic demands of driving— the highest level of the three demands of driving; involves judgment, planning, and foresight, such as choosing to reschedule a trip due to a snowstorm. Examples include route choice and strategies. (Michon, 1979).

Tactical demands of driving— ongoing decisions made while interacting with traffic while driving, such as time and space judgment of a safe gap in traffic to execute a left turn. Examples include speed, wipers, lights and lane placement. (Michon, 1979).

Visual Perception - the total process responsible for the reception and cognition of visual stimuli (Ohio Health, (AOTA power point)

Visual-Receptive Component – the process of extracting and organizing info from the environment

Visual-Cognitive Component – ability to interpret and use what is seen



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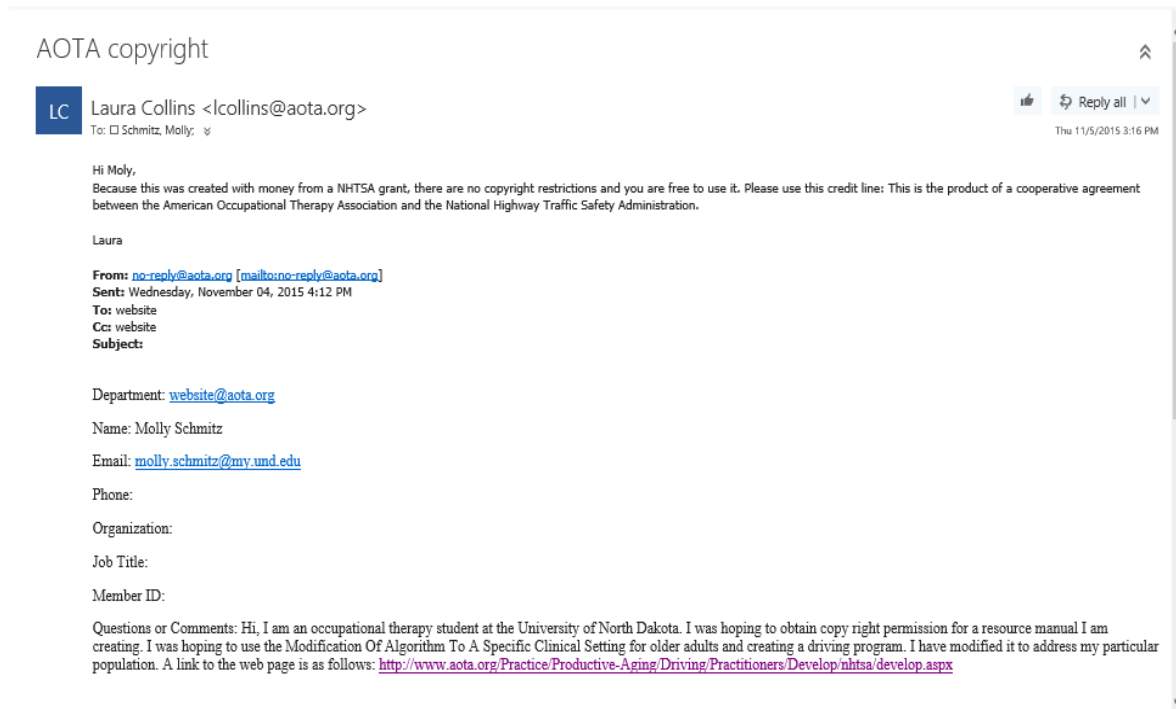
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## **Chapter V**

### **SUMMARY**

The purpose of this project was to bridge the gap in communication between occupational therapy practitioners and individuals with ADHD and their families in relation to readiness to drive. The guide provides them with support, education, and additional resources for program development. Through utilization of an occupational therapy perspective, this guide focuses on promoting safety and increased quality of life for individuals with ADHD in relation to driving, which ultimately facilitates the performance and safety of other individuals in the community as well.

After an extensive literature review, the *Driving Resource Guide for Occupational Therapists and Individuals with ADHD* was developed. This resource guide was based on the concepts of the Model of Human Occupation. MOHO was used as a guide during the development of this resource guide based on the core concepts associated with the model especially volition. For example, adolescents want (volition) to gain a successful occupational identity of being a driver and drivers with ADHD need additional supports to gain occupational competence with driving due to pre-existing visual perceptual, cognitive, and motor coordination deficits. Thus, MOHO was utilized to consider the individual's volition and performance capacities in relation to safety with driving. Components from MOHO were utilized throughout the manual to provide

organization and direction of what resources to include in this resource guide. Thus, it was imminent to include resources that impacted performance capacity, habituation, and volition.

The resource guide provides a comprehensive overview of the role of occupational therapy and driving, value of driving, communication between parents and teens, assessments and interventions associated with providing and seeking services from practitioners and the viewpoint of individuals with ADHD. Final attributes of the resource guide provide varying assessments, intervention strategies and resources for program development to address individuals' safe engagement in the occupation of driving. Integration of all components into one condensed document provides a simplistic and efficient way to assist in providing quality care to individuals with ADHD and occupational therapy practitioners.

### **Limitations**

The limitations of the product include lack of current state and commercial driving programs for teens, as well as not addressing a specific region and their resources offered that address teen driving. It will also be a limitation when distributing the guide to practicing OT's as there is a chance some facilities may be missed.

Limitations of the literature include a lack of OT literature pertaining to assessments that are specific to individuals with ADHD and driving, as well as lack of research on evidence-based interventions. There was a limited amount of information found in regards to OT interventions and assessments specific to this population and to the occupation of driving. Throughout the literature review process there was evidence of

a lack of awareness on the health care provider's end in regards to communicating concerns to families and teens with ADHD and the impact of ADHD on safety with driving. The literature review also provided evidence of lack of resources provided to practitioners that addressed teens with ADHD and driving interventions. As a result, a resource guide was created to bridge the communication between families and healthcare professionals, in addition to providing resources for interventions that address safety and driving.

### **Recommendations**

There are several recommendations for the use of this product as well as future work to increase usability and generalization of the *Driving Resource Guide for Occupational Therapists and Individuals with ADHD*.

1. Distributing this resource to occupation therapy practices within the state, specifically outpatient clinics/rehab facilities as well as potentially secondary education sites in the school system will increase usability and generalization of the guide. The resource guide may best be accessed through emailing this resource guide to outpatient clinics in the tri-state area. Several hard copies could be printed and mailed to various clinics.
2. Integrating and expanding the resource guide can also enable generalization and applicability to other states or other forms of community mobility. The material within the manual briefly denotes aspects of the intricate occupation of driving; however, there are a few driving rehabilitation programs available to teens, not specifically in this region, which were not included in the guide.

3. To increase usability, it is recommended to conduct a needs assessment for instituting a driving rehabilitation program within the tri state area. The needs for this program may be assessed by distributing surveys within the tri state area to schools, parents or providers alike, and measuring the usefulness of the information gathered.

### **Conclusion**

#### *Driving Resource Guide for Occupational Therapists and Individuals with ADHD*

is best used as a general outline and guide when working with individuals with ADHD and learning to drive. This resource is meant to assist in understanding the intricate value of driving and the impact of ADHD on driving. It is also meant to provide practitioners with resources in addressing readiness to drive and intervention planning. As each individual's values and cultures may differ, therapists working with this population can add additional clinical reasoning and skilled-practice concepts in cohesion with this resource. Finally, importance lies in seeking opportunities to enhance the scope of practice through evidence-based research within this adolescent population and the resources available to practitioners.

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